

Khan's Hand Book
of
Success

BIOLOGY

For Intermediate Part I

Muhammad Abdullah Khakwani

11

Khan's Hand Book of Success For First Year Biology

According to New Pattern (2012-2013)

By

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Govt. Millat Degree
College
Multan

For First Year Biology

According to New Pattern (2012-2013)

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DEDICATED

TO

My Teacher

Prof. Syed Anwar Ali Shah
(Late)

PREFACE

All praise to Almighty Allah who enabled me to write this book according to new system of examination introduced by the Government of Punjab. In this book all that material is included that will enable the students to succeed in the examination in a short period of time.

Some of the salient features of the book are as follows:

- a) MCQ s with their answers given in the end of each chapter have been collected together in this book.
- b) Short Questions with their answers at the end of each chapter have also been collected.
- c) MCQ s from Multan and other Boards of Secondary Education are separated as chapter wise and are given in this book with their answers.
- d) Short Questions along with their answers of some important chapters from the Board of Multan and other Boards of Secondary and Higher Secondary Education are collected in this book as chapter wise.

- e) Long questions from Multan and other Boards of Education are separated and collected in this book as chapter wise.
- f) Four questions along with their answers relating to practical are given in this book, which for the first time are taken along with theory questions.

Suggestion and positive criticisms for further improvement of this book shall be most welcomed.

Khan

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Assessment Scheme

For Biology 11th Part I Session 1012-2013 and
ONWARD

Time 3:30
100

Total Marks:

(A)

Objective

This part consists of only one section i.e Section I that includes only MCQ'S

SECTION I MCQ'S

Each question carries only one Mark

Q. to be asked 17
attempted 17

Q. to be

Total Marks: 17 Paper Code Time Allowed: 20 Minutes

Chapter No: 1 -1MCQ
Chapter No: 2 -1MCQ
Chapter No: 3 -1MCQ
Chapter No: 4 -1MCQ
Chapter No: 5 -1MCQ
Chapter No: 6 -1MCQ
Chapter No: 7 -1MCQ
Chapter No: 8 -1MCQ

Chapter No: 9 1MCQ
Chapter No: 10 --2MCQs
Chapter No: 11 --2MCQs
Chapter No: 12 --1MCQ
Chapter No: 13 -2MCQs
Chapter No: 14 -2MCQs

MCQS from Exercise

Chapter No: 1

- 1) Which one of the following is correct sequence in biological methods?
a) Observation Hypothesis LawTheory
b) **ObservationHypothesisDeductionTesting of deduction**
c) HypothesisObservationsDeductionTesting of deduction
d) LawTheoryDeductionObservations.
- 2) Which one of is employed in treatment of cancer?
a) Antibiotics and vaccination
b) **Radiotherapy and chemotherapy**
c) Chemotherapy and antibiotics
d) All of the above
- 3) Which on of the following is not a viral disease? (Multan Board-1st Annual 2008) (Gujranwala Board-2006)
a) Cowpox b) **Mumps** c) Tetanus d) Small pox
- 4) Which one of the following is not related to cloning?
a) Replacement of nucleus of zygote, by another nucleus of the same organism
b) Separation of cells of embryo to form more embryos
c) The individuals resulting have similar genetic make up
d) **Removal of piece of DNA or gene from the cell, and incorporating another gene or piece of DNA in its place**

Chapter No: 2

- 1) Animals obtain carbohydrates mainly from:** (Multan Board-1st Annual 2008)
(Lahore Board-2007)
(Gujranwala Board-2010)
a) Glucose b) **Starch** c) Sucrose d) Glycogen
- 2) Peptide is a:** (Multan Board-1st Annual 2007) (Multan Board-2nd Annual 2010)
a) **C-N link** b) C-O link c) N-H link d) C-H link
- 3) Globular proteins differ from fibrous proteins in:**
a) Having amino acids
b) Their repeating units joined by peptide bond
c) **Being soluble in aqueous medium**
d) Being non-crystalline
- 4) Which of the following kinds of atoms do not occur in the carbohydrates?**
a) Carbon b) Hydrogen c) **Nitrogen** d) Oxygen
- 5) Amino acids are arranged in proper sequence during protein synthesis according to the instructions transcribed on:** (Faislabad Board-2007)
a) Transfer RNA b) Ribosomal RNA
c) **Messenger RNA** d) DNA

Chapter No: 3

- 1) If more substrate to an already occurring enzymatic reaction is added more enzyme activity is seen because:**
- a) There is probably more substrate than there is an enzyme.
 - a) There is probably more substrate than there is an enzyme.
 - b) There is probably more enzyme available than there is substrate.**
 - c) There is probably more product present than there is in either substrate or enzyme.

- d) The enzyme substrate complex is probably failing to form during the reaction.
- 2) **What if you add more substrate to already occurring enzymatic reaction and it has no effect on the rate of reaction? What is the form given for this situation?**
- a) **Saturation** b) Denaturation
 c) Composition d) Inhibition
- 3) **The rate of an enzyme-catalyzed reaction:**
- a) Is constant under all conditions.
 b) Decreases as substrate concentration increases.
 c) Can not be measured.
 d) **Can be reduced by inhibitors.**
- 4) **The active site of an enzyme: (Multan Board-1st Annual 2008)**
- a) Never changes
 b) Forms no chemical bond with substrate
 c) **Determines , by its structure , the specificity of the enzyme.**
 d) Looks like a lump projecting from the surface of an enzyme.
- 5) **Which statement about enzyme is not true?**
- a) They consist of proteins, with or without a non-protein part.
 b) They change the rate of catalyzed reaction.
 c) They are sensitive to heat.
 d) **They are non-specific in their action.**

Chapter No: 4

- 1) **Which statement about the nuclear envelope is not true?**
- a) It has pores.
 b) It is a double membrane structure.
 c) **Its inner membrane bears ribosome.**
 d) RNA and some proteins pass through it.
- 2) **Which statement about Plastids is true? (Multan Board-1st Annual 2008)**
- a) They are surrounded by a single membrane.
 b) They are the power house of cell.
 c) They are found in all organisms.
 d) **They contain DNA and ribosomes.**
- 3) **Which type of cell would probably be most appropriate to study lysosome?**
- a) **Phagocytic white blood cells** b) Nerve cell
 c) Mesophyll cell of leaf. d) Muscle cell
- 4) **Which of the following pairs of structure-functions mismatched?**
- a) Ribosome: protein
 b) Nucleolus: ribosome production.
 c) **Golgi complex: muscle contraction**
 d) Lysosome: intracellular digestion
- 5) **Which of the following statements about ribosome is correct?**
- a) They are structurally different from free ribosome.
 b) They are enclosed in their own membrane.
 c) They are concentrated in the cisternal space of rough endoplasmic reticulum.
 d) **They are attached to cisternal surface.**

Chapter No: 5

- 1) **The enzymes involved in viral replication are synthesized:**
- a) On the viral ribosome
 b) On the interior surface of viral membrane
 c) **By the host cell**
 d) On the interior surface of viral coat

- 2) **A virion is a:** (Multan Board-1st Annual 2008)
a) **Virus** b) Viral protein c) Viral lysozyme d) Viral gene
- 3) **An isolated virus is not considered living, since it:**
a) Separates into two inert parts.
b) **Can not metabolize.**
c) Rapidly loses its genome chemically inert.
d) Is coated with a tight shield.
- 4) **In the lytic cycle of a bacteriophage, the host DNA is:**
a) Replicated b) Turned off by a protein coat
c) **Digested into its nucleotides** d) Turned on by removal of a protein coat
- 5) **In the lysogenic cycle, the DNA of a bacteriophage:**
a) **Joins the bacterial chromosome.**
b) Attaches to the inner surface of the host membrane.
c) Is immediately degraded when it enters the host.
d) Goes directly to the host's ribosome for translation.
- 6) **Temperate phage may exist as:**
a) **Prophage** b) Capsid c) Virion d) Retrovirus
- 7) **Phylogeny describes a species:**
a) Morphological similarities with other species
b) **Evolutionary history**
c) Reproductive compatibilities with other species
d) Geographical distribution
- 8) **In the binomial system of taxonomy developed during the 18th century by C. Linnaeus, the first word of an organism's name (e.g. *Homo sapiens*) is its:**
a) Species b) **Genus** c) Race d) Family
- 9) **In the five kingdom system of classification developed by Robert Whittaker, the member of kingdom Plantae are autotrophic, eukaryotic and:** (Multan Board-1st Annual 2007)
a) **Multicellular** b) Motile
c) Either unicellular or multi-cellular d) Have sexual reproduction
- 10) **Five kingdom system of classification proposed by Margulis and Schwartz is not based on:**
a) Genetics b) Cellular organization
c) **Nucleic acid** d) Mode of nutrition
- 11) **The common name of *Allium cepa* is:**
a) **Piyaz** b) Bathu c) Amaltas d) Chana
- 12) **Arrange the following in order of increasing group size, beginning with the smallest:**
family, kingdom, species, phylum (or division), genus, order and class:
e) **Class** f) **Phylum (or Division)** g) **Kingdom**
- 13) **Pigs are reservoirs to:**
a) Hepatitis A b) Hepatitis B
c) Hepatitis C d) Hepatitis D
e) **Hepatitis E**
- 14) **Which one of the following is false about AIDS?**
a) HIV b) Auto-immune deficiency syndrome c) T-lymphocytes
d) **HAV** e) Host specific

Chapter No: 6

- 1) Which one of the following is not found in all bacterial cells? (Gujranawala Board-2006)
 a) Cell membrane b) Ribosome c) A nucleoid **d) Capsule**
- 2) A major locomotory structures in bacteria are:
 a) **Flagella** b) Fimbriae c) Pili d) Cilia
- 3) Which one of the following is a primary cell wall function?
 a) Transport **b) Support** c) Motility d) Adhesion
- 4) Which of the following is present in both gram-positive & gram-negative cell wall?
 (Gujranwala Board-2010)
 a) An outer membrane **b) Peptidoglycan**
 c) Techoic acid d) Lipo-polysaccharides
- 5) Mesosomes are internal extensions of the: (Lahore Board-2006) (Gujranwala Board-2007)
 a) Cell wall **b) Cell membrane**
 c) Chromatin body d) Capsule
- 6) Bacterial spores function in: (Dera Ghazi Khan Board (A)-2012)
 a) Reproduction b) Protein synthesis **c) Survival** d) Storage

Chapter No:7

- 1) Amoebas move and obtain food by means of: (Multan Board-1st Annual 2007) (Gujranawala Board-2006) (Faisalabad Board-2007) (Faisalabad Board-2008)
 a) Plasmodium b) Flagella c) Cilia
d) Pseudopodia e) Gametangia
- 2) The sexual process exhibited by most ciliates is called: (Multan Board-1st Annual 2008) (Bahawalpur Board-2007) (Bahawalpur Board-2012) (Sargodha Board-2012) (Faisalabad Board-2009)
 a) Oogamy b) Binary fission **c) Conjugation**
 d) Fertilization e) Zygote
- 3) Parasitic protozoans that form spores at some stage in their life belong to which group:
 (Lahore Board-2009)
 a) Ciliates b) Actinopods c) Diatoms
d) Apicomplexans e) Zooflagellates
- 4) Algae which have shells composed of two halves that fit together like Petri dish belong to: (Gujranawala Board-2007)
 a) Brown algae **b) Diatoms** c) Euglenoids
 d) Green algae e) Red algae
- 5) Algae in which body is differentiated into blades, stipes and holdfast belong to: (Multan Board-2nd Annual 2007)
 a) Golden algae b) Diatoms **c) Kelps**
 d) Euglenoids e) Green algae
- 6) Chlorophyll a, chlorophyll b and carotenoids are found in:
 a) Green algae, golden algae and diatoms
 b) Green algae, golden algae and euglenoids
c) Green algae, euglenoids and plants
 d) Red algae, euglenoids and brown algae
 e) Red algae, golden algae and plants
- 7) The feeding stage of a slime mold is called: (Bahawalpur Board-2009) (Lahore Board-2005)

(Rawalpindi Board-2011) (Sargodha Board-2005) (Sargodha Board-2012)

- a) Mycelium b) Pseudopodium c) Hyphae
d) Plasmodium e) Rhizoids

8) Cell wall in Oomycetes is chemically composed of:

- a) Cellulose b) Chitin c) Proteins
d) Lignin e) Proteins and some

carbohydrates

Chapter No:8

1) Which statement about fungal nutrition is not true?

- a) Some fungi are active predators.
b) Some fungi are mutualist.
c) Facultative parasitic fungi can grow only on their specific host.
d) All fungi require mineral nutrients.

2) The absorptive nutrition of fungi is aided by:

- a) Spore formation
b) Their large surface area-volume ratio
c) They are all parasites
d) They form fruiting bodies

3) The Zygomycetes:

- a) Have hyphae without regularly occurring cross walls.
b) Produce motile gametes.
c) Are haploid throughout their life.
d) Answers "a" and "c" are both correct.

4) Which of the following cells / structures are associated with asexual reproduction in

fungi? (Bahawalpur Board-2007)

- a) Ascospores b) Conidia
c) Zygosporangia d) Basidiospores

Basidiospores

5) The closest relatives of fungi are probably: (Gujranawala Board-2010)

- a) Animals b) Slime molds
c) Brown algae d) Vascular

plants

6) Unicellular fungi are the:

- a) Rusts b) Brown mold c) Green mold d) Yeasts

7) An ascus is to ascomycetes as is a to basidiomycetes:

- a) Basidiopore b)

Basidiocarp

- c) Basidium d)

Haustorium

8) Which statement is not true about Deuteromycetes?

- a) They are also called imperfect fungi.
b) Their asexual spores are called conidia.
c) It is a heterogenous polyphyletic group.
d) They have both asexual and sexual reproduction.

Chapter No: 9

1) All bryophytes (mosses, liverworts and hornworts) share certain characteristics. These are:

- a) Reproductive cells in protective chambers and a waxy cuticle
b) A waxy cuticle, true leaves and reproductive cells in protective chambers
c) Vascular tissues, true leaves and a waxy cuticle
d) Reproductive cells in protective chambers and vascular tissues
e) Vascular tissues and a waxy cuticle

2) A heterosporous plant is one that: (Multan Board-1st Annual 2008)

- a) Produces a gametophyte that bears both sex organs

- b) **Produces microspores and megaspores in separate sporangia, giving rise to separate male and female gametophytes**
- c) Is a seedless vascular plant
- d) Produces two kinds of spores, one asexually by mitosis and one type by meiosis
- e) Reproduces only sexually
- 3) **The male gametophyte of an angiosperm is the: (Multan Board-1st Annual 2008) (Bahawalpur Board-2009) (Dera Ghazi Khan Board-2008) (Gujranawala Board-2008) (Faisalabad Board-2007)**
- a) Anther b) Embryo sac c) Microspore
- d) **Germinated pollen grain** e) Ovule
- 4) **Important terrestrial adaptations that evolved exclusively in seed plants include all of the following except:**
- a) Pollination by wind or animal instead of fertilization by swimming sperm
- b) **Transport of water through vascular tissues**
- c) Retention of the gametophyte plant within the sporophyte
- d) Dispersal of new plants by seeds
- e) Protection and nourishment of the embryo within the seeds

Chapter No: 10

- 1) **Vertebrates that develop embryonic membranes around their embryos are called (Amniotes, Anamniotes).**
- 2) **In animals the bodies of which can be divided into two equal halves only in one plane are (asymmetrical, bilaterally symmetrical, radially symmetrical).**
- 3) **Animals that have their body filled with parenchyma are (Acoelomates, Coelomates, Pseudocoelomates).**
- 4) **The vertebrates in which placenta is formed during the development of fetus are (Pisces, Aves, Mammals).**
- 5) **In amphibians the necessary requirements to spend their life history are (land, water, or both).**
- 6) ***Trypanosoma* causes the disease (malaria, sleeping sickness).**
- 7) **In annelids the organs for excretion are (flame-cells, nephredia, kidneys).**
- 8) **In arthropoda the body cavity is (pseudocoelom, enterocoel, haemocoel).**
- 9) **In mollusca the foot is used for (capturing prey, locomotion, or both).**

Chapter No: 11

- 1) **Magnesium is an important nutrient in green plants as it is an essential component of: (Dera Ghazi Khan Board-2009) (Gujranawala Board-2007)**
- a) Cell sap b) Protein c) **Chlorophyll** d) Glucose
- 2) **When a green plant performs photosynthesis at its maximum rate:**
- a) The rate of water loss is low.
- b) **The water content of the plant will be low.**
- c) The energy content of the plant will be low.
- d) The energy content will be unaffected.
- 3) **During the dark reactions of photosynthesis, the main process which occurs is:**
- a) Release of oxygen
- b) Energy absorption by chlorophyll
- c) **Adding of hydrogen to carbon dioxide**

- 5) Digestion in Hydra and Planaria takes place within its:** (Faisalabad Board-2011) (Faisalabad Board-2008)
- a) Coelom b) Alimentary canal
- c) Gastrovascular cavity d) Transport molecule
- 6) Mucus in saliva is made of:**
- a) Glycolipids b) Proteins
- c) Phospholipids d) Saturated fatty acids
- 7) Structure in the mouth that prevents food from entering the nasal cavities is the:** (Multan Board-1st Annual 2007) (Dera Ghazi Khan Board-2009) (Gujranawala Board-2007)
- a) Epiglottis b) Soft palate c) Tongue d) Pharynx
- 8) A mammalian herbivore has:**
- a) Fewer teeth than a carnivore
- b) Flatter teeth than a carnivore
- c) More teeth than a carnivore
- d) More pointed than a carnivore
- 9) Many humans become ill from consuming milk and milk products because they lack:** (Rawalpindi Board-2011)
- a) Bacteria in their intestines b) Rennin
- c) Lactase d) Hydrochloric acid
- 10) Which of the following animals has no need for a gall bladder?** (Gujranawala Board-2010)
- a) Cat b) Man c) Lion d) Goat

- 1) Which of the following is not true of guard cells?
 a) They are present in the epidermis of leaf.
b) They are connected with plasmodesmata with other epidermal cells.
 c) They contain chloroplasts.
 d) They are kidney shaped.
- 2) The casparian strips are present in: (Multan Board-1st Annual 2007) (Bahawalpur Board-2012) (Dera Ghazi Khan Board-2011) (Faisalabad Board-2011)
 a) Cortex cells of roots
b) Endodermis cells
 c) Cells of pericycle
 d) Cells of phloem
- 3) Lymph most closely resembles with: (Multan Board-2nd Annual 2007) (Gujranawala Board-2006)
 a) Blood
 b) Plasma
c) Interstitial fluid
 d) Urine
- 4) Hydathodes are associated with: (Multan Board-1st Annual 2008) (Multan Board-(S) 2011) (Bahawalpur Board-2011) (Gujranawala Board-2007) (Gujranawala Board-2010) (Faisalabad Board-2008)
 a) Transpiration
b) Guttation
 c) Conduction
 d) None of above
- 5) According to pressure flow theory, which of the following serve as sink:
 a) Leaves
 b) Stem
c) Roots
 d) None of above
- 6) Which of the following is true about mammals?
 a) They have right aortic arch only.
b) They have left aortic arch only.
 c) They have right and left aortic arches.
 d) They do not have aortic arches.
- 7) The process that most likely/directly enables a root hair cell to absorb minerals by active transport and enables a muscle cell to contract is:
 a) Circulation
 b) Excretion
c) Respiration
 d) Assimilation
- 8) Which of the following processes cause substances to move across membranes without the expenditure of cellular energy? (Multan Board-1st Annual 2007)
 a) Endocytosis
 b) Active transport
c) Diffusion
 d) None of above
- 9) Cardiac muscle can be distinguished from other muscles fibers because Cardiac Muscles:
 a) Contain only actin.
 b) Voluntary in action.
 c) Lack regular arrangement of sarcomas
d) Has intercalary discs.

MCQ'S From

Multan, and other Boards of Secondary and Higher Secondary Education of Punjab

Chapter No: 1 1MCQ Multan
Board

- 1) The reasoning that moves from general to specific is called: (Multan Board-1st Annual 2007)
 a) Inductive
b) Deductive
 c) Hypothesis
 d) None of these

- 2) The described species number of the living organisms: (Multan Board-2nd Annual 2007)**
 a) 1.5 millions **b) 2.5 millions** c) 3.00 millions d) 4.00 millions
- 3) A large regional community primarily determined by climate: (Model Paper of Multan Board-2006-2008)**
 a) Population b) Biosphere c) Ecosystem **d) Biome**
- 4) Which one of the following is not a viral disease? (Multan Board-1st Annual 2008)**
 a) Cow pox b) Mumps **c) Tetanus** d) Small pox
- 5) The living substance of living being is called: (Multan Board-2nd Annual 2008)**
 a) Cytoplasm b) Cell c) DNA **d) Protoplasm**
- 6) Populations of different species living in the same habitat form a: (Multan Board-1st Annual - 2009)**
 a) Biome b) Biosphere **c) Community** d) All these
- 7) A technique has been developed to repair defective gene is: (Multan Board-2nd Annual 2009)**
 a) Chemo-therapy b) Radio-therapy **c) Gene-therapy** d) None
- 8) A group of similar cells that perform similar functions is: (Multan Board-1st Annual 2010)**
 a) Organ **b) Tissue** c) System d) Organelle
- 9) The branch of biology which deals with the social behaviour and communal life of human being is: (Multan Board-(S) 2010)**
 A) Human Biology **B) Social Biology**
 C) Biotechnology D) Molecular Biology
- 10) The tentative explanation of observation is called: (Multan Board-(A) 2011)**
 A) Law B) Theory **C) Hypothesis** D) Deduction
- 11) A structure within cell that performs specific function is called: (Multan Board-(S) 2011)**
 A) Molecule B) Atom **C) Organelle** D) Compound
- 12) The study of internal structure is: (Multan Board-1st Annual 2012)**
 A) Morphology **B) Anatomy** C) Histology D) Physiology
- 13) The study of tissues is called: (Model Paper of Multan Board Session 2012-2013 and onward)**
 A) Palaentology B) Anatomy **C) Histology** D) Evolution
- 14) A structure normally composed of several tissue types that form a functional unit called: (Multan Board-1st Annual 2013)**
 A) Organ system B) Organelle **C) Organ** D) Tissue

Bahawalpur Board

- 1) The study of microorganisms such as bacteria, viruses is called: (Bahawalpur Board-2007)**
 a) Parasitology b) Cytology c) Virology **d) Microbiology**
- 2) In humans, 99 % of body mass is made up of: (Bahawalpur Board-2008)**
 a) 16 bio-elements **b) 6 bio-elements**
 c) 25 bio-elements d) 92 bio-elements
- 3) Preservation of milk and milk products is occurred by: (Bahawalpur Board-2009)**
 a) Boiling **b) Pasteurization** c) Drying d) All of these
- 4) An aphid that attacks walnut tree is being controlled by: (Bahawalpur Board-2010)**

- 5) **a) Wasp** b) Fungi c) Bacteria d) Mosquito
Cretaceous, Jurassic and Triassic are Periods of Era: (Bahawalpur Board-2011)
- 6) A) Proterozoic B) Palaeozoic **C) Mesozoic** D) Cenozoic
A number of species identified so far is: (Bahawalpur Board-2012)
- A) 4.5 million B) 3.5 million **C) 2.5 million** D) 1.5 million
- 7) **The branch of Biology which deals with the use of living organisms, systems or process in manufacturing and service industry is called: (Bahawalpur Board-2013)**
- A) Molecular Biology B) Social Biology
C) Biotechnology D) Human Biology

Dera Ghazi Khan Board

- 1) The branch of Biology which deals with the structure of organisms: (Dera Ghazi Khan Board-2008)
a) Morphology b) Palaentology c) Parasitology d) Physiology
- 2) The tentative explanation of observation is called: (Dera Ghazi Khan Board-2009)
a) Law b) Theory c) Hypothesis d) Deduction
- 3) A structure within the cell that performs a specific function is: (Dera Ghazi Khan Board-2010)
a) Cell b) Tissue c) Organ d) Organelle
- 4) The number of species identified so far is: (Dera Ghazi Khan Board-2011)
A) 10 million B) 5 million C) 2.5 million D) 1.5 million
- 5) A technique that consists of isolating the normal gene and inserting it into the host through bone marrow is: (Dera Ghazi Khan Board-2012)
A) Radiotherapy B) Chemotherapy C) Gene Therapy D) Clonning

Lahore Board

- | | | | |
|-----------|--|--------------|---------------------|
| 1) | Defective genes can be repaired: (Lahore Board-2004) | b) | Gene therapy |
| | a) Chemotherapy | | |
| | c) Radiotherapy | | d) Physiotherapy |
| 2) | Fungi, algae, protozoans and various prokaryotes are: (Lahore Board-2006) | | |
| | a) 17.6 % | b) 19.9 % | c) 9.4 % |
| | | | d) 9.1 % |
| 3) | The number of the species of insects is: (Lahore Board-2007) | | |
| | a) 53.1 % | b) 17.6 % | c) 19.9 % |
| | | | d) 9.4 % |
| 4) | The reasoning from the general to specific is: (Lahore Board-2008) | | |
| | a) Deductive | b) Inductive | c) Scientific |
| | | | d) Theoretical |
| 5) | The technique used to preserve milk and milk products is called: (Lahore Board-2009) | | |
| 6) | Populations of different species living in an area in specific time form a: (Lahore Board-2010) | | |
| | a) Colony | b) Tribe | c) Committee |
| | | | d) Community |

- 7) **The technique used to preserve milk and milk products is called: (Lahore Board-2011)**
 A) Vaccination B) Lactation
C) Pasteurization D) Concentration
- 8) **Tentative explanation of observation is called as: (Lahore Board-2012)**
A) Hypothesis B) Deduction C) Law D) Theory
- 9) **The most recent era is: (Lahore Board-2012)**
 A) Proterozoic B) Paleozoic **C) Cenozoic** D) Mesozoic
- 10) **Milk and milk products are preserved by: (A-2013- Group I)**
A) Pasteurization b) Vaccination c) Immunization d) Cloning
- 11) **The percentage of posporous in uman body is: (A-2013- Group II)**
A) 1 % B) 2 % C) 3 % D) 4 %

Gujranwala Board

- 1) **Which one of the following is not a viral disease? (Gujranwala Board-2006)**
 a) Cow pox b) Mumps **c) Tetanus** d) Small pox
- 2) **The tentative explanation of observation is called: (Gojranwala Board-2007)**
a) Hypothesis b) Deduction c) Law d) Theory
- 3) **The branch of biology which deals with the study of social behavior and communal life of human being is: (Gujranwala Board-2008)**
 a) Human biology b) Molecular biology
c) Social biology d) Environmental biology
- 4) **First vaccination technique was developed by: (Gujranwala Board-2009)**
a) Jenner b) Kock c) Pasteur d) Brown
- 5) **The amount of Na by weight in the human body is: (Gujranwala Board-2010)**
 a) .35 % b) .25 % **c) 0.15 %** d) 0.05 %
- 6) **Scientist who first developed the technique of vaccination in 1795: (Gujranwala Board-2011)**
 A) Louis Pasteure **B) Edward Jenner**
 C) Robert Koch D) Robert Brown
- 7) **In human body, the amount of Phosphorous is: (Gujranwala Board-2012)**
A) 1 % B) 2% C) 3% D) 4%
- 8) **Percentage of Hydrogen in human body is: (A-2013)**
 A) 5 % **B) 10 %** C) 15 % D) 20 %

Rawalpindi Board

- 1) **The amount of Potassium by weight in human body is: (Rawalpindi Board-2010)**
a) 0.35 % b) 0.25 % c) 0.15 % d) 0.05
- 2) **A large regional community primarily determined by climate is: (Rawalpindi Board-2011)**
 A) Habitat B) Niche **C) Biome** D) Environment
- 3) **The microscopic study of tissues is called: (Rawalpindi Board-2012)**
A) Histology B) Microbiology C) Bacteriology D) Virology
- 4) **The study of distribution of animals in nature is called: (A-2013)**
 A) Ecology B) Wild life C) Geography D) Zoogeography

Sargodha Board

- 1) **A community together with its non-living surroundings is: (Sargodha Board-2010)**
 a) Community b) Population c) **Ecosystem** d) Biosphere
- 2) **Radiotherapy is used for: (Sargodha Board-2011)**
 A) **Cancer** B) AIDS C) Hepatitis D) Malaria
- 3) **Muscle tissue is specialized for: (Sargodha Board-2012)**
 A) **Contraction** B) Conduction C) Secretion D) Excretion
- 4) **A large regional community primarily determined by climate is called as: (A-2013)**
 A) **Biome** B) Biosphere C) Population D) Community

Faislabad Board

- 1) **A technique that consists of isolating the normal gene and inserting it into the host through bone marrow is: (Faislabad Board-2007)**
 a) Radio-therapy b) Chemo-therapy c) **Gene-therapy** d) Cloning
- 2) **Degradation of environmental pollutants by living organisms is: (Faislabad Board-2008)**
 a) Biogeography b) **Bioremediation** c) Biopesticides d) None
- 3) **A biome is a large regional community primarily determined by: (Faislabad Board-2009)**
 a) Species b) Weather c) **Climate** d) Water
- 4) **The branch of biology which deals with the use of living organisms, systems or processes in manufacturing and service industries is: (Faislabad Board-2010)**
 a) Parasitology b) Human biology
 c) **Biotechnology** d) Social biology
- 5) **The study of distribution of animals in nature is called: (Faislabad Board-2011)**
 A) Wild life B) Geography C) Biodiversity D) **Zoogeography**
- 6) **Tentative explanation of observation is called as: (Faislabad Board-2012)**
 A) Law B) Theory C) **Hypothesis** D) Deduction
- 7) **In cities, particularly the exhaust from auto mobiles is enormously adding into atmosphere: (A-2013)**
 A) Chromium B) Nitrogen C) **Lead** D) Cyanide

Chapter No:2 1 MCQ Multan Board

- 1) **Peptide bond is a: (Multan Board-1st Annual 2007)**
 a) **C-N link** b) C-O link c) N-H link d) C-H link
- 2) **Enzymes, antibodies, hormones and hemoglobin are examples of: (Multan Board--2nd Annual 2007)**
 a) Ovular proteins b) **Globular proteins**

- c) Fibrous proteins d) Tough proteins
- 3) Substances which on hydrolysis yield polyhydroxy aldehyde or ketone sub-units: (Model Paper of Multan Board-2006-2008)**
- a) Acylglycerol b) Polypeptides
- c) Carbohydrates** d) Nucleic acids
- 4) Animals obtain Carbohydrates mainly from: (Multan Board-1st Annual 2008)**
- a) Glucose b) Starch c) Sucrose d) Glycogen
- 5) The covalent bond between two Monosaccharides is called: (Multan Board-2nd Annual 2008)**
- a) Peptide bond b) **Glycosidic bond**
- c) Ester bond d) Phosphodiester bond
- 6) Each turn of alpha helix of polypeptide chain has Amino Acids: (Multan Board-1st Annual 2009)**
- a) 36 b) **3.6** c) 2.6 d) Many
- 7) Cotton is the pure form of: (Multan Board-2nd Annual 2009)**
- a) Starch b) Glycogen c) **Cellulose** d) Glucose
- 8) Phosphatidylcholine is one of the common: (Multan Board-1st Annual 2010)**
- a) **Phospholipid** b) Sphingolipid
- c) Glycolipid d) Terpenoid
- 9) A peptide bond is: (Multan Board-2nd Annual 2010)**
- A) C-H link B) C-O link C) N-H link **D) C-N link**
- 10) Carbon is: (Multan Board-(A) 2011)**
- A) Monovalent B) Divalent C) Trivalent **D) Tetravalent**
- 11) Our blood normally contains glucose: (Multan Board-(S) 2011)**
- A) 8 % B) 1 % C) 0.8 % **D) 0.08 %**
- 12) The % age of t RNA in a cell is: (Multan Board-1st Annual 2012)**
- A) 3-4 % B) 40-50 % C) 80 % **D) 10-20 %**
- 13) The percentage of water in bacterial cell is: (Model Paper of Multan Board Session 2012-2013 and Onward)**
- A) 70 %** B) 60% C) 50 % D) 40 %
- 14) The compound formed by combination of a nitrogen base and a pentose sugar is called: (Multan Board-1st Annual 2013)**
- A) Nucleotide **B) Nucleoside** C) Polypeptide D) Polysaccharide

Bahawalpur Board

- 1) The covalent bond between two monosaccharides is called: (Bahawalpur Board-2007)**
- a) Ionic bond b) Covalent bond
- c) Glycosidic bond** d) Peptide bond
- 2) The number of amino-acids in alpha chain of hemoglobin is: (Bahawalpur Board-2008)**
- a) 121 **b) 141** c) 146 d) None of these
- 3) The bond formed between two Monosaccharides to form Oligosaccharide is: (Bahawalpur Board-2009)**
- a) H-bond b) Peptide bond **c) Glycosidic bond** d) C-C bond
- 3) Tetroses are rare in nature and occur in some: (Bahawalpur Board-2010)**

- a) Algae b) Fungi c) **Bacteria** d)
- Bryophytes
- 4) Dextrin, Agar, Pectin and Chitin are: (Bahawalpur Board-2011)**
- A) Carbohydrate** B) Lipid C) Protein D) Nucleic Acid
- 5) The amount of heat absorbed by a liquid when it changes into gas is called: (Bahawalpur Board-2012)**
- A) Heat capacity **B) Heat of vaporization**
- C) Specific heat D) Absorbed heat
- 6) Nucleohistones are present in: (Bahawalpur Board-2013)**
- A) Nucleoli **B) Chromosomes** C) Ribosomes D) Mitochondria

Lahore Board

- 8) **Phosphatidylcholine is one of the common:** (Lahore Board-2012)
 A) Acylglycerol **B) Phospholipid** C) Terpenoid D) Wax
- 9) **Keratin is an example of fibrous proteins present in:** (A-2013-Group I)
 A) Blood B) Muscle C) Bones **D) Nail and hair**
- 10) Which of the following atoms do not occur in carbohydrates: (A-2013- Group II)
 A) Carbon B) Hydrogen C) Oxygen **D) Nitrogen**

Gujranwala Board

- 1) **The heterogenous group of compounds related to fatty acids is called:** (Gujranawala Board-2007)
 a) Protein **b) Lipid** c) Glucose d) Carbohydrates
- 2) **Cotton is the pure form of:** (Gujranwala Board-2008)
a) Cellulose b) Glycogen c) Wax d) Amino acid
- 3) **Carbon is:** (Gujranwala Board-2009)
 a) Divalent b) Trivalent c) Monovalent **d) Tetravalent**
- 4) **Animals obtain carbohydrates mainly from:** (Gujranwala Board-2010)
 a) Glucose **b) Starch** c) Sucrose d) Glycogen
- 5) **The most abundant carbohydrate in nature is:** (Gujranwala Board-2011)
 A) Starch B) Glycogen **C) Cellulose** D) Agar
- 6) **Which is not a conjugated molecule?** (Gujranwala Board-2012)
 A) Glycoprotein B) Glycolipid **C) Polysaccharide** D) Lipoprotein
- 7) **Amount of solar energy required to synthesize 10 grams of glucose is:** (A-2013)
 A) 617.6 Kcal **B) 717.6 Kcal** C) 817.6 Kcal D) 917.6 Kcal

Rawalpindi Board

- 1) **The sequence of amino acids in a protein molecule was determined by:** (Rawalpindi Board-2010)
 a) E.Chatton b) F.Meischer **c) F.Sanger** d) J.Watson
- 2) **Amylose starch is:** (Rawalpindi Board-2011)
 A) Unbranched and soluble in cold water
 B) Branched and soluble in cold water
 C) Branched and soluble in organic solvent
D) Unbranched and soluble in hot water
- 3) **The specific heat of vaporization of H₂O is:** (Rawalpindi Board-2012)
 A) 374 B) 474 **C) 574** D) 674
- 4) **Our blood normally contains glucose:** (A-2013)
 A) 0.6 % B) 0.8 % C) 0.06 % **D) 0.08 %**

Sargodha Board

- 1) **The chief form of carbohydrates stored in animal body is:** (Sargodha Board-2010)
 a) Starch **b) Glycogen** c) Cellulose d) Glucose
- 2) **Which one is the most common polysaccharide on earth?** (Sargodha Board-2011)

- A) Starch B) Cellulose C) Glycogen D) Dextrin
- 3) **Most of the monosaccharides form a ring structure when in:** (Sargodha Board-2012)
- A) Water B) Solution C) Solvent D) Stomach
- 4) **Which one of the following is not a polysaccharide? (A-2013)**
- A) Chitin B) Cutin C) Pectin D) Dextrin

Faislabad Board

- 1) **Amino acids are arranged in proper sequence during protein synthesis according to the instructions transcribed on:** (Faislabad Board-2007)
- a) Transfer RNA b) Ribosomal RNA
c) Messenger RNA d) DNA
- 2) **It comprises about 3 to 4 % of the cellular RNA:** (Faislabad Board-2008)
- a) m RNA b) r RNA c) t RNA d) None of these
- 3) **The alpha chain of haemoglobin has amino acids:** (Faislabad Board-2009)
- a) 174 b) 171 c) 141 d) 146
- 4) **Carbon is:** (Faislabad Board-2010)
- a) Bivalent b) Trivalent c) Covalent d) Tetravalent
- 5) **Human tissues have 85% water in cells of:** (Faislabad Board-2011)
- A) Brain B) Bone C) Blood D) Liver
- 6) **The most abundant carbohydrate in nature is:** (Faislabad Board 2012)
- A) Starch B) Cellulose C) Glycogen D) Agar
- 7) **Which is the most abundant carbohydrate in nature? (A-2013)**
- A) Cellulose B) Glycogen C) Glucose D) Starch

Chapter No: 3 1MCQ Multan Board

- 1) **All enzymes are proteins:** (Multan Board-1st Annual 2007)
- a) Fibrous b) Globular c) Non-enzymatic d) None
- 2) **The inactive form of enzyme Pepsin is:** (Multan Board-2nd Annual 2007)
- a) Holoenzyme b) Pepsinogen c) Apoenzyme d) None
- 3) **The active site of an enzyme:** (Multan Board-1st Annual 2008)
- a) Never changes
b) Forms no chemical bond with substrate
c) **Determines, by its structure, the specificity of enzyme**
d) Looks like a lump projecting from surface of an enzyme
- 4) **An activated enzyme consisting of polypeptide chain and cofactor is called:** (Multan Board-2nd Annual 2008)
- a) Apoenzyme b) Holoenzyme c) Co-enzyme d) None
- 5) **The Optimum pH of Pepsin is:** (Multan Board-1st Annual 2009)
- a) 2.00 b) 2.50 c) 3.00 d) 4.00
- 6) **Induce Fit Model was proposed by:** (Multan Board-2nd Annual 2009)
- a) Koshland b) Emil Fischer c) Sanger d) Meischer
- 7) **The optimum pH for action of Pancreatic Lipase is:** (Multan Board-1st Annual 2010)
- a) 3.00 b) 5.00 c) 7.00 d) 9.00

8) The rate of reaction depends directly on the amount of: (Multan Board-2nd Annual 2010)

- A) pH B) Temperature
C) Enzyme concentration D) Substrate

concentration

9) Co-enzyme is closely related to: (Multan Board(A) 2011)

- A) Vitamins B) Minerals C) Water D) Lipids

10) The catalytic activity of enzyme is restricted to a small portion of the enzyme known

as: (Multan Board(S) 2011)

- A) Active site B) Catalytic site C) Binding site D)

Reacting site

11) Enzymes involved in the synthesis of proteins are integral part of:

(Multan Board-1st Annual 2012)

- A) Chloroplast B) Mitochondria C) Ribosome D)

Golgi complex

12) The optimum pH value for pepsin enzyme in stomach is: (Model Paper of Multan BoardSession

2012-2013 and onward)

- A) 4.0 B) 3.5 C) 3.0 D)

2.0

13) Induce Fit Model of enzyme action was proposed by: (Multan Board-1st Annual 2013)

- A) Emil Fischer B) Lorenz Oken C) Rudlof Virchow D)

Koshland

Bahawalpur Board

1) When the non-protein part of the enzyme is covalently bonded, it is known as:

(Bahawalpur Board-2007)

- a) Prosthetic group b) Cofactor c) Co-enzyme d)

Activator

2) Optimum pH for pepsin is: (Bahawalpur Board-2008)

- a) 4 b) 2 c) 9 d) 9.70

3) The reversible inhibitors have: (Bahawalpur Board-2009)

- a) Strong linkage with enzyme b) Weak linkage
c) No linkage d) Medium linkage

4) Co-enzyme is closely related to: (Bahawalpur Board-2010)

- a) Water b) Vitamins c) Minerals d) Lipids

5) Optimum pH of Arginase is: (Bahawalpur Board-2011)

- A) 6.70 B) 7.70 C) 8.70 D) 9.70

6) The catalytic activity of enzyme is restricted to a small portion of enzyme, known as:

(Bahawalpur Board-2012)

- A) Active site B) Catalytic site C) Binding site D)

Reacting site

7) Extreme changes in pH cause the bonds in enzyme to break resulting in the: (Bahawalpur

Board-2013)

- A) Activation of Enzyme B) Inhibition of Enzyme
C) Denaturation of Enzyme D) None of these

Dera Ghazi Khan Board

1) The optimum pH for pancreatic lipase is: (Dera Ghazi Khan Board-2008)

- a) 2.00 b) 5.50 c) 7.6 d) 9.0

2) An activated enzyme consisting of polypeptide chain and co-factor is called:

(Dera Ghazi Khan Board-2009)

- 3) **Reversible inhibitors form weak linkages with the:** (Dera Ghazi Khan Board-2010)
a) Apoenzyme **b) Holoenzyme** c) Co-enzyme d) None
- 4) **The optimum pH of Enterokinase is:** (Dera Ghazi Khan Board-2011)
A) 4.5 B) 5.00 **C) 5.50** D) 6.50
5. **According to Lock and Key Model the active site is:** (Dera Ghazi Khan Board-2012)
A) Rigid structure B) Flexible C) Liquid D) All of these

Lahore Board

- 1) **If non-protein part is loosely attached to the protein part, it is known as:** (Lahore Board-2005)
a) Co-factor **b) Coenzyme** c) Holoenzyme d) Prosthetic group
- 2) **The optimum pH of Salivary Amylase is:** (Lahore Board-2006)
a) 2.80 b) 4.80 **c) 6.80** d) 8.80
- 3) **Salivary amylase works at pH:** (Lahore Board-2006)
a) 2.00 b) 9.70 **c) 6.80** d) 5.50
- 4) **The optimum pH of Enterokinase is:** (Lahore Board-2007)
a) 1.50 b) 3.50 **c) 5.50** d) 7.50
- 5) **If non-protein part is loosely attached to the protein part, it is known as:** (Lahore Board-2008)
a) Co-factor **b) Co-enzyme**
c) Holoenzyme d) Prosthetic group
- 6) **The functional specificity of every enzyme is the consequence of its specific:** (Lahore Board-2009)
a) Chemistry b) Configuration
c) Concentration **d) Both chemistry and configuration**
- 7) **Poisons like cyanides, antibiotics and some drugs are examples of:** (Lahore Board-2010)
a) Enzymes b) Co-enzymes **c) Inhibitors** d) Co-factors
- 8) **Salivary Amylase acts best at pH:** (Lahore Board-2011)
A) 4.5 **B) 6.8** C) 7.2 D) 8.5
- 9) **The product of succinic acid by the action of enzymes is:** (Lahore Board-2012)
A) Fumaric acid B) Malonic acid C) Citric acid D) Pyruvic acid
- 10) **If non-protein part is covalently bonded to enzyme is called as:** (Lahore Board-2012)
A) Coenzyme **B) Prosthetic group** C) Activator D) Apoenzyme
- 11) **An activated enzyme consisting of polypeptide chain and co-factor is called:** (A-2013-Group I)
A) Apoenzyme B) Activator **C) Holoenzyme** D) Inhibitor
- 12) **The optimum pH of pancreatic lipase is:** (A-2013- Group II)
A) 6.0 B) 7.0 C) 8.0 **D) 9.0**

Gujranwala Board

- 1) **The non-protein part of enzyme is known as: (Gujranawal Board-2007)**
a) Activator b) Co-enzyme c) **Co-factor** d) Polypeptides
- 2) **A lock and key model was proposed by: (Gujranawal Board-2008)**
a) Koshland b) **Emil Fischer**
c) Lorenz Oken d) Rodolf Virchow
- 3) **Enzymes lower down the energy of: (Gujranawal Board-2009)**
a) Kinetic b) Potential c) Ionic d) **Activation**
- 4) **An activated enzyme consisting of polypeptide chain and a co-factor is known as: (Gujranawal Board-2010)**
a) Apoenzyme b) **Holoenzyme**
c) Co-enzyme d) Activator
- 5) **Optimum pH for Pepsin is: (Gujranwala Board-2011)**
A) **2.00** B) 4.50 C) 5.50 D) 6.80
- 6) **Induced Fit Model was proposed by: (Gujranwala Board-2012)**
A) Emil Fisher B) Robert Brown C) **Koshland** D) Robert Koch
- 7) **If non-protein part is covalently bonded to the enzyme, it is called: (A-2013)**
A) Coenzyme B) Apoenzyme C) Activator D) **Prosthetic group**

Rawalpindi Board

- 1) **4.50 is optimum pH value for the enzyme: (Rawalpindi Board-2010)**
a) Arginase b) **Sucrase** c) Enterokinase d) Chymocryptase
- 2) **Enzymes that are integral part of ribosome are responsible for synthesis of: (Rawalpindi Board-2011)**
A) Lipids B) **Proteins** C) Carbohydrates D) Nuceic acids
- 3) **Lock and Key Model was proposed by: (Rawalpindi Board-2012)**
A) Koshland B) **Fisher** C) Flemming D) Watson
- 4) **The optimum pH of pepsin is: (A-2013)**
A) **2.00** B) 4.00 C) 6.00 D) 8.00

Sargodha Board

- 1) **If non-protein part is loosely attached to the protein part it is known as: (Sargodha Board 2006)**
a) Co-factor b) **Coenzyme**
c) Holoenzyme d) Prosthetic group
- 2) **All enzymes are globular: (Sargodha Board-2010)**
a) Carbohydrates b) Lipid c) Nucleic acid d) **Protein**
- 3) **The optimum pH for Salivary Amylase is: (Sargodha Board-2011)**
A) 2 B) 4 C) **6.8** D) 7.8
- 4) **Reversible inhibitors form weak linkages with the: (Sargodha Board-2012)**
A) **Enzyme** B) Reactant C) Product D) Substrate

Faislabad Board

- 1) **An activated enzyme consisting of polypeptide chain and a co-factor is known as:**
(Faislabad Board-2007)
a) Apoenzyme b) **Holoenzyme** c) Enzyme d) Co-enzyme
- 2) **An activated enzyme consisting of polypeptide chain and a co-factor is:**
(Faislabad Board-2008)
a) Apoenzyme b) Cofactor c) **Holozyme** d) Co-enzyme
- 3) **An enzyme and substrate react with each other through charge bearing sites called:**
(Faislabad Board-2009)
a) Locus b) Centromere c) **Active sites** d) None
- 4) **Non-protein part of enzyme is called:** (Faislabad Board-2010)
a) **Co-factor** b) Activator c) Prosthetic group d) Vitamins
- 5) **If non-protein part is loosely attached to the protein part of enzyme, it is known as:**
(Faislabad Board-2011)
A) Co-factor B) Prosthetic group
C) **Co-enzyme** D) Apo-enzyme
- 6) **Optimum pH of pepsin is:** (Faislabad Board 2012)
A) **2.00** B) 4.50 C) 5.50 D) 6.80
- 7) **Which one is essential raw material for coenzymes? (A-2013)**
A) Proteins B) **Vitamins** C) Carbohydrates D) Lipids

Chapter No: 4 1 MCQ Multan Board

- 1) **In 1831, the presence of nucleus in the cell was reported by:** (Multan Board-2007)
a) Robert Koch b) Robert Hooke
c) Robert Mug Abe d) **Robert Brown**
- 2) **Who reported the presence of Nucleus in the cell?** (Multan Board-1st Annual 2007)
a) **Robert Brown** b) Schwann c) Lorenz d) Hooke
- 3) **Which statement about plastid is true?** (Multan Board-1st Annual 2008)
a) They are surrounded by single membrane
b) They are power house of the cell.
c) They are found in all organisms.
d) **They contain DNA and Ribosomes.**
- 4) **Tay Sachs disease results due to accumulation in brain cells:** (Model Paper of Multan Board-2006-2008)
a) Many ions b) Glucose c) **Lipids** d) RNA
- 5) **The resolution of electron microscope ranges between:** (Multan Board-2nd Annual 2008)
a) 1-2 Angstrom b) 2-3 Angstrom
c) **2-4 Angstrom** d) 1-4 Angstrom
- 6) **A group of ribosomes attached to m RNA is known as:** (Multan Board-1st Annual 2009)
a) Autophagosomes b) **Polysomes** c) Cisterna d) None
- 7) **A chromosome is composed of:** (Multan Board-2nd Annual 2009)

- [illegible]

Bahawalpur Board

- 1) **The soluble part of cytoplasm is called: (Bahawalpur Board-2007)**
a) Cisternae b) Gel c) Polysome d) **Cytosol**
- 2) **The number of Chromosomes in sperm of *Drosophila* is: (Bahawalpur Board-2008)**
a) 8 b) **4** c) 6 d) 23
- 3) ***Ominis cellula-e-cellula* is the statement of: (Bahawalpur Board-2009)**
a) Darwin b) Hooke
c) Leeuwenhooke d) **Rudolf Virchow**
- 4) **Micrographia was published by: (Bahawalpur Board-2010)**
a) **Robert Hooke** b) Robert Brown
c) Lorenz Oken d) Louis Pasteur
- 5) **The enzymes for Glyoxylate cycle are located in the: (Bahawalpur Board-2011)**
A) Golgi Bodies B) Lysosomes
C) **Glyoxysomes** D) Peroxisomes
- 6) **Cyclosis and amoeboid movements are because of: (Bahawalpur Board-2012)**
A) Microtubules B) **Microfilaments**
C) Intermediate filaments D) Macrotubules
- 7) **In 1831, Robert Brown reported the presence of: (Bahawalpur Board-2013)**
A) Golgi Bodies in Cell B) Mitochondria in Cell
C) Lysosomes in Cell D) **Nucleus in Cell**

Dera Ghazi Khan Board

- 1) There are 3 or 4 pores in: (Dera Ghazi Khan Board-2008)**
- a) Egg cell b) Erythrocytes c) Liver cells d) Neurons
- 2) The resolution of Electron microscope ranges between: (Dera Ghazi Khan Board-2009)**
- a) 1-2 Angstrom b) 2-3 Angstrom
c) 2-4 Angstrom d) 1-4 angstrom
- 3) Centriole is associated with: (Dera Ghazi Khan Board-2010)**

- a) DNA synthesis
formation
 c) Respiration
4) Centriole is associated with: (Dera Ghazi Khan Board-2011)
 A) DNA synthesis
formation
 C) Respiration
5. Membrane bounded green pigment containing bodies present in the cells are called as:
(Dera Ghazi Khan Board-2011)
 A) Plastids
B) Chloroplasts
 C) Chromoplasts
 D) Leucoplasts

Lahore Board

- 1) Ribosomes are particles of:** (Lahore Board-2005)
a) Riboglyco-protein b) Riboglyco-lipid
c) Ribonucleo-protein d) Ribonucleo-lipid
- 2) The cells which secrete their hormones are:** (Lahore Board-2005)
a) Blood cells b) Nerve cells c) Cell walls **d) Gland cells**
- 3) The number of chromosomes in fruit fly *Drosophila melanogaster* is:** (Lahore Board-2006)
a) 16 b) 26 **c) 8** d) 48
- 4) Resolution of electron microscope ranges between:** (Lahore Board-2007)
a) 1-2 um b) 1-5 mm c) 1-3 Angstrom **d) 2-4 Angstrom**
- 5) The ribosomal RNA (r RNA) is synthesized and stored in:** (Lahore Board-2007)
a) Nucleus **b) Nucleolus** c) Nuceoplasm d) Mitochondria
- 6) Endocytosis which involves ingestion of solid material is:** (Lahore Board-2008)
a) Pinocytosis **b) Phagocytosis**
c) Solidococytosis d) Both b and c
- 7) What is first to be formed between two newly formed plant cell?** (Lahore Board-2009)
a) Cell membrane **b) Primary cell wall**
c) Secondary cell wall d) None of these
- 8) Lysosomes were isolated and studied for the first time by:** (Lahore Board-2010)
a) Polade **b) De-Duve** c) Golgi d) Virchow
- 9) Lysosomes were discovered by:** (Lahore Board-2011)
A) Schawann B) Virchow C) Golgi **D) De-Duve**
- 10) In prokaryotic cell wall strengthening material is:** (Lahore Board-2012)
A) Chitin B) Lignin C) Cutin **D) Murein**
- 11) The cyclosis and ameboid movements are due to:** (Lahore Board-2012)
A) Microtubules **B) Microfilament**
C) Intermediate filament D) All of these
- 12) Tay-Sach's disease result due to accumulation of:** (A-2013-Group I)
A) Lipids B) Proteins C) Glucose D) DNA
- 13) Chitin is found in the cell wall of:** (A-2013-Group II)
A) Algae B) Bacteria **C) Funqi** D) Plants

Gujranwala Board

- 1) **Resolution power of a typical microscope is: (Gujranawal Board-2004)**
 a) 1.0 um b) 2.0 um c) 300 X d) **2-4 Angstrom**
- 2) **The fluid which surrounds the thylakoid is called: (Gujranawal Board-2005)**
 a) Matrix b) **Stroma** c) Milieu d) Medium
- 3) **Membrane bound green pigment containing bodies present in the cells are called: (Gujranwala Board-2007)**
 a) Plastids b) **Chloroplasts**
 c) Chromoplasts d) Leukoplasts
- 4) **Generally the cells with more than two nuclei are called: (Gujranawala Board-2008)**
 a) Anucleate b) **Multinucleate**
 c) Binucleate d) Mononucleate
- 5) **Eukaryotic ribosomal units when combined make up: (Gujranawala Board-2009)**
 a) 100 S particles b) 90 S particles
 c) **80 S particles** d) 70 S particles
- 6) **The cell theory was proposed by: (Gujranawala Board-2010)**
 a) Larenz Oken b) Robert Brown
 c) **Schwann and Schleiden** d) Rudolf Virchow
- 7) **Protein present in Microtubules is: (Gujranwala Board-2011)**
 A) Actin B) Myosin C) **Tubulin** D) Tropomyosin
- 8) **Tay-Sach's disease is because of the absence of an enzyme that is involved in the catabolism of: (Gujranwala Board-2012)**
 A) Proteins B) Polysaccharides C) Oligosaccharides D) **Lipids**
- 9) **Which is not found in secondary wall? (A-2013)**
 A) **Lignin** B) Cutin C) Pectin D) Silica

Rawalpindi Board

- 1) **Micrographia is the famous publication of: (Rawalpindi Board-2010)**
 a) **Robert Hooke** b) Rbert Brown
 c) Robert Kock d) Rudolf Virchow
- 2) **The statement "*Omnis cellula-e -cellula*" was given by: (Rawalpindi Board-2011)**
 A) Oken B) Lamark C) **Virchow** D) Pasteur
- 3) **The resolution of electron microscope ranges between: (Rawalpindi Board-2012)**
 A) 2-6 um B) **2-4 Angstrom** C) 3-6 Angstrom D) 3-9 um
- 4) **Cell membrane has 60-80 %: (A-2013)**
 A) Lipids B) **Proteins** C) Carbohydrates D) Vitamins

Sargodha Board

- 1) **Ribosomes are particles of: (Sargodha Board 2005)**
 a) Riboglyco-protein b) Riboglyco-lipid

- lipid
- c) **Ribonucleo-protein** d) Ribonucleo-
- 2) **The cells which secrete their hormones are: (Sargodha Board 2005)**
 a) Blood cells b) Nerve cells c) **Gland cells** d) Bone
- cells
- 3) **A group of ribosomes attached to m RNA is known as: (Sargodha Board-2010)**
 a) Lysosome b) **Polysome** c) Peroxisome d) Glyoxisome
- 4) **Which of the one in the following is a prokaryote? (Sargodha Board-2011)**
 A) Amoeba B) Alga C) Fungus **D) Blue green**
- alga
- 5) **The fluid that surrounds the thylakoid is called: (Sargodha Board-2012)**
 A) Matrix **B) Stroma** C) Miliess D) Medium
- 6) **Ta-sach disease is because of absence of an enzyme that is involved in catabolism of: (A-2013)**
 A) Polysaccharides B) Oligosaccharides C) Proteins **D)**
- Lipids

Faislabad Board

- 1) **Cell was discovered by: (Faislabad Board-2007)**
 a) Robert Brown b) Lorenz Oken
 c) **Robert Hooke** d) Schleiden
- 2) **They impart colors other than green: (Faislabad Board-2008)**
 a) Chloroplasts b) **Chromoplasts** c) Leucoplasts d)
- None
- 3) **The number of chromosomes in fruitfly *Drosophila melanogaster* is: (Faislabad Board-2009)**
 a) **8** b) 18 c) 28 d) 16
- 4) **Resolution of typical compound microscope is: (Faislabad Board-2010)**
 a) 1.0 um b) **2.0 um** c) 3.0 um d) 4.0 um
- 5) **Cyclosis and Ameboid Movement are because of: (Faislabad Board-2011)**
 A) Microtubules **B) Microfilaments**
 C) Intermediate filaments D) Centrioles
- 6) **The protein present in microtubules is: (Faislabad Board 2012)**
 A) Actin B) Myosin C) Tropomyosin **D) Tubulin**
- 7) **All are related to secondary cell wall, except: (A-2013)**
 A) **Cutin** B) Silica C) Waxes D) Cellulose

Chapter No: 5 1MCQ

Multan Board

- 1) **In five kingdom classification developed by Whittaker, member of the Kingdom**
Plantae are autotrophic, eukaryote and: (Multan Board-1st Annual 2007)
 a) **Multicellular** b) Motile
 c) Having sexual reproduction d) None of these
- 2) **The scientific name of onion is: (Multan Board-2nd Annual 2007)**
 a) *Cassia fistula* b) ***Allium cepa***
 c) *Solanum esculentum* d) *Solanum tuberosum*
- 3) **The infectious proteins are: (Model Paper of Multan Board-2006-2008)**
 a) Viruses b) Viroids c) Virions **d) Prions**
- 4) **A virion is a: (Multan Board-1st Annual 2008)**
 a) **Virus** b) Viral protein c) Viral lysozome d) Viral gene
- 5) **In classification, an order is sub-divided into: (Multan Board-2nd Annual 200)**
 a) Classes b) **Families** c) Genera d) Species
- 6) **Capsid is made up of protein and subunits known as: (Multan Board-1st Annual 2009)**
 a) Sarcomere b) **Capsomere** c) Capsoids d) None
- 7) **The botanical name of onion is: (Multan Board-2nd Annual 2009)**

- a) *Zea mays* b) *Cassia fistula*
c) *Solanum tuberosum* d) *Allium cepa*
- 8) **Mad cow infection and mysterious brain infection in man are caused by:** (Multan Board-1st Annual 2010)
a) Bacteria b) Virions c) Fungi d) **Prions**
- 9) **The botanical name of corn is:** (Multan Board-(S) 2010)
A) *Avena sativa* B) *Triticum aestivum*
C) ***Zea mays*** D) *Solanum tuberosum*
- 10) **Scientific name for potato is:** (Multan Board-(A) 2011)
A) *Solanum nigrum* B) ***Solanum tuberosum***
C) *Solanum melangena* D) *Solanum*
xanthocarpum
- 11) **A family includes related:** (Multan Board-(S) 2011)
A) Individuals B) Species C) **Genera** D)
- Orders
12) **Hepatitis D is also called:** (Multan Board-(A) 2012)
A) Serum Hepatitis B) Infectious
Hepatitis C) **Delta Hepatitis** D) Bacterial
Hepatitis
- 13) **In classification the order of *Zea mays* is:** (Model Paper of Multan Board Session 2012-2013 and onward)
A) **Poales** B) Anthophyta C) Plantae D)
Poaceae
- 14) **Which one of the following is not a RNA virus?** (Multan Board-1st Annual 2013)
A) Retrovirus B) Paramyxoviruses C) **Herpes virus** D)
Polio virus

Bahawalpur Board

- 1) **Capsid is made up of protein sub-units known as:** (Bahawalpur Board-2007)
a) Protein b) **Capsomeres** c) Envelope d) Genome
- 2) **Which of these is also called as Serum Hepatitis?** (Bahawalpur Board-2008)
a) Hepatitis A b) **Hepatitis B** c) Hepatitis E d) None
- 3) **One of the following is caused by HIV:** (Bahawalpur Board-2009)
a) Typhoid b) **AIDS** c) Malaria d) Sleeping
Sickness
- 4) **HIV infects and multiplies in:** (Bahawalpur Board-2010)
a) Cat b) **Monkey** c) Dog d) Pigs
- 5) **Foot and Mouth disease is caused by:** (Bahawalpur Board-2011)
A) Algae B) Bacteria C) Fungi D) **Virus**
- 6) **Family includes related:** (Bahawalpur Board-2012)
A) Individuals B) Species C) **Genera** D) Orders
- 7) **Small pox is caused by Pox Virus which is:** (Bahawalpur Board-2013)
A) DNA Naked Virus B) RNA Naked Virus
C) **DNA Enveloped Virus** D) Complex Virus

Dera Ghazi Khan Board

- 1) **Five kingdom systems classification was proposed by:** (Dera Ghazi Khan Board-2008)
a) E.Chotton b) Ernst Haeckel
c) Linnaeus d) **Robert Whittaker**
- 2) **The branch which deals with the study of Virus is called:** (Dera Ghazi Khan Board-2009)
a) Biology b) Cytology c) **Virology** d) Texanomy

3) The five kingdom system of classification is proposed by: (Dera Ghazi Khan Board-2010)

- a) R. Koch b) R. Hooke c) R. Brown d) R.

Whittaker

4) Linnaeus published the list of names of plants and animals in: (Dera Ghazi Khan Board-2011)

- A) 1750 B) 1763 C) 1756 D) 1758

5) The major cell infected by HIV is the helper: (A-2012)

- A) A-Monocyte B) T-Monocyte C) B-Lymphocyte D) T-

Lymphocyte

Lahore Board

1) Paramyxoviruses cause the disease: (Lahore Board-2004)

- a) Influenza b) Polio
c) Mumps and measles d) Herpes simplex

2) The major cell infected by HIV is the helper: (Lahore Board-2007)

- a) A-Monocyte b) T-Monocyte
c) B-Lymphocyte d) T-Lymphocyte

3) The scientific name of onion (piyaz) is: (Lahore Board-2007)

- a) *Allium cepa* b) *Cassia fistula*
c) *Homo sapiens* d) *Solanum*

tuberosum

4) Which of the following is not caused by virus? (Lahore Board-2008)

- a) Cholera b) Hepatitis c) Influenza d) Polio

5) Which type of hepatitis leads to chronic liver disease? (Lahore Board-2009)

- a) Hepatitis A b) Hepatitis B c) Hepatitis C d) Hepatitis

D

6) The basic unit of classification is: (Lahore Board-2010)

- a) Genus b) Phylum c) Class d) Species

7) The smallest known viruses are of: (Lahore Board-2011)

- A) Bacteriophage B) Small pox C) Polio D) Mumps

8) Towart in 1915 and D Herelle in 1917 discovered: (Lahore Board-2012)

- A) Pox virus B) Adenovirus C) Bacteriophages D)

Herpes virus

9) Small pox is: (Lahore Board-2012)

- A) DNA virus B) DNA enveloped virus
C) RNA virus D) RNA enveloped virus

10) Hepatitis and cholera is spread by: (Lahore Board-2012)

- A) Trypanosoma B) Fleas C) Tse-Tse fly D) House fly

11) Bacteriophage replicates only in cell: (A-2013-Group I)

- A) Animal B) Plant C) Bacterial D) Fungal

12) Foot and mouth disease is caused by: (A-2013-Group II)

- A) Algae B) Bacteria C) Fungi D) Virus

Gujranwala Board

1) Small pox is caused by: (Gujranawala Board-2005)

- a) Virus b) Bacteria c) Fungi d) Protozoa

2) A temperate phage may exist as: (Gujranawala Board-2006)

- a) Prophage b) Capsid c) Viroid d) Retrovirus

3) The branch of which deals with the study of virus is called: (Gujranawala Board-2007)

- a) Biology b) Cytology c) Virology d) Taxonomy

4) AIDS is caused by: (Gujranawala Board-2008)

- a) Fungi b) Bacteria c) Virus d) Lichen

5) Influenza viruses are: (Gujranawala Board-2009)

- a) DNA enveloped b) DNA naked

- 5) The scientific name of onion is: (Faislabad Board-2009)
 a) *Allium cepa* b) *Cassia*
fistula
 c) *Homo sapiens* d) *Solanum*
nigrum
- 6) Botanical name for potato is: (Faislabad Board-2010)
 a) *Solanum melangena* b) *Cassia fistula*
 c) *Solanum tuberosum* d) *Zea mays*
- 7) The Capsomeres present in the Capsid of Adenovirus are: (Faislabad Board-2011)
 A) 162 B) 200 C) 252 D) 352
- 8) Small pox is caused by: (Faislabad Board-2012)
 A) Bacteria B) Fungi C) Virus D) Protozoans
- 9) The smallest known viruses they contain RNA in spherical capsid are the: (A-2013)
 A) Herpes viruses B) Influenza viruses C) Polio viruses D) Pox viruses

Chapter No: 6 1 MCQ
Multan Board

- 1) Some bacteria exchange genetic material from a donor to a recipient during a process called: (Multan Board-1st Annual 2007)
 a) Crossing over b) **Conjugation** c) Linkage d) None
- 2) Bacteria require low concentration of oxygen: (Model Paper of Multan Board-2006-2008)
 a) Aerobic b) Anaerobic c) **Microaerophilic** d) Facultative
- 3) Which of the following is not found in all bacterial cells? (Multan Board-1st Annual 2008)
 a) Cell membrane b) Ribosome c) A Nucleoid d) **Capsule**
- 4) Which of the following do not possess cell wall? (Multan Board-2nd Annual 2008)
 a) *E. coli* b) *Mycoplasma* c) *Vibrio* d) *Yeast*
- 5) Bacteria without any flagella are called: (Multan Board-1st Annual 2009)
 a) Peritrichous b) **Atrichous**
 c) Lophotrichous d) Monotrichous
- 6) The dormant, thick walled, desiccation resistant forms in bacteria are: (Multan Board-2nd Annual 2009)
 a) Spore b) **Cyst** c) Plasmid d) Nucleoid
- 7) Curved or comma shaped bacteria are called: (Multan Board-1st Annual 2010)
 a) **Vibrio** b) *Spirillum* c) *Spirochetes* d) *Bacilli*
- 8) Mesosomes are invagination of: (Multan Board-(S) 2010)
 A) Cell wall B) **Cell membrane** C) Nuclear membrane D) Tonoplast
- 9) Pili are primarily involved in a mating process between cells called: (Multan Board-(A) 2011)
 A) **Conjugation** B) Translocation C) Transformation D) Binary Fission
- 10) Some bacteria are microaerophilic like: (Multan Board-(S) 2011)
 A) *Pseudomonas* B) *Compylobacter* C) *E.coli* D) *Spirochete*
- 11) Grape like cluster of Cocci is called: (Multan Board-(A) 2012)
 A) **Saphylococcus** B) *Streptococcus* C) *Sarcina* D) Tetrad

12) The bacteria with tuft of flagella at one pole are called: (Model Paper of Multan Board Session

2012-2013 and onward)

- A) Atrichous B) Monotrichous C) **Lophotrichous** D) Amphitrichous

13) Bacteria divide at exponential rate during: (Multan Board-1st Annual 2013)

- A) Stationary phase B) Decline phase C) **Log phase** D) lag phase

Bahawalpur Board

1) If tuft of flagella is present only at one pole of bacteria called as:

(Bahawalpur Board-i2007)

- a) Atrichous b) **Lophotrichous** c) Peritrichous d) None

2) Sarcina is a cube of: (Bahawalpur Board-2008)

- a) 6 Cocci b) **8 Cocci** c) 4 Cocci d) 4 Bacilli

3) Bacterial Cell Membrane also contains enzyme for: (Bahawalpur Board-2009)

- a) **Respiration** b) Photosynthesis c) Both a and b d) None

4) Important vectors in modern genetic engineering techniques are:

(Bahawalpur Board-2010)

- a) Mesosomes b) Ribosomes c) **Plasmids** d) Nucleoid

5) Which of the following do not have cell wall? (Bahawalpur Board-2011)

- A) E.coli B) **Mycoplasma** C) Vibrio D) Spirochete

6) Some bacteria are microaerophilic like: (Bahawalpur Board-2012)

- A) **Compylobacter** B) *Pseudomonas* C) *E.coli* D) Spirochete

7) Germ Theory of Disease was formulated by: (Bahawalpur Board-2013)

- A) Louis Pasteur B) **Robert Kock**
C) Antone Van Leeuwenhoek D) Edward Jenner

Dera Ghazi Khan Board

1) Many bacteria contain an extra nuclear, double stranded circular DNA called: (Dera

Ghazi Khan Board-2008)

- a) Cyst b) Mesosome c) **Plasmid** d) Spore

2) Which of the following do not possess cell wall? (Dera Ghazi Khan Board-2009)

- a) *E.coli* b) **Mycoplasma** c) Vibrio d) Yeast

3) Bacteria without any flagella are called: (Dera Ghazi Khan Board-2010)

- a) **Atrichous** b) Monotrichous c) Lophotrichous d) Peritrichous

4) When tuft of flagella are present at two poles of bacteria, the condition is called: (Dera

Ghazi Khan Board-2011)

- A) Lophotrichous B) Peritrichous C) Atrichous D) **Amphitrichous**

5. Bacteria endospores function in: (Dera Ghazi Khan Board-2012)

- A) Nutrition B) Reproduction C) **Survival** D) Protein Synthesis

Lahore Board

1) Mesosomes are internal extensions of the: (Lahore Board-2006)

- a) Cell wall b) Capsule c) **Cell membrane** d) All these

2) Rapid phase of growth of bacteria is: (Lahore Board-2007)

- a) Lag phase **b) Log phase** c) Stationary phase d) Decline phase
- 3) A bacterium with single flagellum is: (Lahore Board-2008)**
a) Atrichous b) Lophotrichous c) Amphitrichous **d) Monotrichous**
- 4) Cyanobacteria exist in the form of: (Lahore Board-2009)**
a) Unicellular b) Filaments c) Colony **d) All of these**
- 5) These are smallest and without cell wall: (Lahore Board-2010)**
a) *Mycoplasma* b) *Pseudomonas* c) Spirochete d) *E. coli*
- 6) A cube of 8 Cocci is called: (Lahore Board-2011)**
A) *Sarcina* B) Octomer C) Tetrad D) Streptococci
- 7) Which one of the following is a microaerophilic bacterium? (Lahore Board-2012)**
A) *Compylobacter* B) *Pseudomonas* C) Spirochete D) *E. coli*
- 8) Aerobic bacterium is: (Lahore Board-2012)**
A) *Compylobacter* B) *E. coli* **C) *Pseudomonas*** D) None of these
- 9) The phase of rapid growth in bacterial is called: (A-2013-Group I)**
A) Lag phase **B) Log phase** C) Stationary D) Death
- 10) Which one of the following requires low concentration of oxygen? (A-2013-Group II)**
A) *E. coli* B) Spirochete C) *Pseudomonas* **D) *Compylobacter***

Gujranwala Board

- 1) The condition in which bacteria are without any flagella is called: (Gujranawala Board-2004)**
a) Monotrichous **b) Atrichous** c) Lophotrichous d) Amphitrichous
- 2) Which one of the following is not found in all bacteria? (Gujranawala Board-2006)**
a) Cell membrane b) Ribosomes c) Nucleoid **d) Capsule**
- 3) Mesosomes are internal extensions of the: (Gujranwala Board-2007)**
a) Cell wall **b) Cell membrane** c) Chromatin d) Capsule
- 4) Bacteria increase in number by an asexual means of reproduction called: (Gujranwala Board-2008)**
a) Binary fission b) Regeneration c) Budding **d) All of these**
- 5) Conjugation in bacteria is promoted by: (Gujranwala Board-2009)**
a) Flagella **b) Pili** c) Cilia d) Gametes
- 6) Which is present in both gram-positive bacteria and gram-negative cell wall? (Gujranwala Board-2010)**
a) An outer membrane **b) Peptidoglycan**
c) Teichoic acid d) Lipopolysaccharides
- 7) Important vector in a modern genetic engineering technique is: (Gujranwala Board-2011)**
A) **Plasmid** B) Nucleoid C) Mesosome D) Ribosome
- 8) Misuse of Streptomycin can cause: (Gujranawala Board-2012)**
A) Allergic reactions B) Dis-coloration of teeth C) Head ache **D) Deafness**
- 9) Which is a microaerophilic bacterium? (A-2013)**
A) *Pseudomonas* B) Spirochete **C) *Compylobacter*** D) *E. coli*

Rawalpindi Board

- 1) **Misuse of penicillin may cause: (Rawalpindi Board-2010)**
a) Fever b) Deafness c) **Allergy** d) Discoloration of teeth
- 2) **The word "Antibiotic" is: (Rawalpindi Board-2011)**
A) Italian B) Latin C) French **D) Greek**
- 3) **Primary function of flagella is to help in: (Rawalpindi Board-2012)**
A) Walking **B) Motility** C) Running D) Rest
- 4) **A tetrad is a square of: (A-2013)**
A) 2 cocci **B) 4 cocci** C) 6 cocci D) 8 cocci

Sargodha Board

- 1) **Bacterial arrangement in having division in random planes is: (Sargodha Board-2010)**
a) **Staphylococcus** b) Sterptococcus c) Sarcina d) Tetrad
- 2) **The smallest bacteria is: (Sargodha Board-2011)**
A) Mycoplasma B) *E. coli* C) Compylobacteria D) *Clostridium*
- 3) **The condition in which bacteria have a single polar flagellum is called: (Sargodha Board-2012)**
A) Monotrichous B) Atrichous C) Lophotrichous D) Amphitrichous
- 4) **If tuft of flagella is present only at one pole of bacteria then these are called as: (A-2013)**
A) Monotrichous B) Peritrichous C) Amphitrichous **D) Lophotrichous**

Faislabad Board

- 1) **Bacteria which are able to grow in the presence of oxygen is called: (Faislabad Board-2007)**
a) **Aerobic bacteria** b) Anaerobic bacteria
c) Facultative bacteria d) Microaerophilic bacteria
- 2) **If tuft of flagella is present only at one pole: (Faislabad Board-2008)**
a) **Lophotrichous** b) Monotrichous
c) Ampitrichous d) Peritrichous
- 3) **Who proved that microorganisms could cause disease? (Faislabad Board-2010)**
a) **Louis pasture** b) A.V.Leeuwenhook
c) Robert Hooke d) Robert Brown
- 4) **Bacterial membranes differ from eukaryotic membranes in lacking: (Faislabad Board-2011)**
A) Cholesterol B) Proteins C) Lipids D) Techoic acid
- 5) **Reserve food material in Cyanobacteria is: (Faislabad Board 2012)**
A) Starch **B) Glycogen** C) Fats D) Glycerol
- 6) **The cell wall of most bacteria have a unique macromolecule called: (A-2013)**
A) Chitin **B) Peptidoglycan** C) Protoplast D) Cellulose

Chapter No: 7 1 MCQ

Multan Board

- 1) **Amoebas move and obtain food by means of:** (Multan Board-1st Annual 2007)
 a) Cilia b) Flagella c) Plasmodium d)

Pseudopodia

- 2) **Algae in which body is differentiated into Blades, stipes and hold fast belong to:**

(Multan Board-2nd Annual 2007)

- a) Golden algae b) Diatoms c) **Kelps** d) Green algae

- 3) **The cell wall consists of two shells that overlap like a petridish:**

(Model Paper of Multan Board-2006-2008)

- a) Forameniferans b) Actinopods c) Slime molds d)

Diatoms

- 4) **The sexual process exhibited by most ciliates is called:** (Multan Board-1st Annual 2008)

- a) Oogamy b) Binary fission c) **Conjugation** d) Fertilization

- 5) **Pseudopodia are present in:** (Multan Board-2nd Annual 2008)

- a) Amoeba b) Actinopods c) Foraminiferans d) **All of these**

- 6) **Algae in which body is differentiated into Blades, stipes and hold fast belong to:**

(Multan Board-1st Annual 2009)

- a) Golden algae b) **Kelps** c) Diatoms d) Euglenoids

- 7) **Most ciliates are capable of a sexual process called:** (Multan Board-2nd Annual 2009)

- a) Transduction b) **Conjugation**
 c) Transformation d) Double fertilization

- 8) **An outer flexible covering of ciliate is:** (Multan Board-1st Annual 2010)

- a) Cell wall b) **Pellicle** c) Sheath d) Cuticle

- 9) **Ecologically, dinoflagellates are one of the most important groups of:** (Multan Board-(S) 2010)

- A) **Producer** B) Primary consumers
 C) Secondary consumers D) Decomposers

- 10) **A human parasite causing African Sleeping Sickness is:** (Multan Board-(A) 2011)

- A) *Euglena* B) ***Trypanosoma***
 C) *Stentor* D) *Vorticella*

- 11) **Most ciliates are capable of sexual process called:** (Multan Board-(S) 2011)

- A) **Conjugation** B) Oogamy C) Mating D) Plasmogamy

Plasmogamy

- 12) **Apicomplexans move by means of:** (Multan Board-(A) 2012)

- A) Cilia B) Flagella C) **Flexing** D) All of these

- 13) **Apicomplexan move by:** (Model Paper of Multan Board Session 2012-2013 and onward)

- A) Tube feet B) Pseudopodia C) Undulating D) **Flexing**

Flexing

- 14) **Phycoerythrin is found in:** (Multan Board-1st Annual 2013)

- A) Rhodophyta B) **Rhodophyta** C) Phaeophyta D) Chrysophyta

Bahawalpur Board

- 1) **The sexual process exhibited by most ciliates is called:** (Bahawalpur Board-2007)

- a) Oogamy b) Binary fission c) **Conjugation** d) Fertilization

- 2) ***Volvox* belongs to phylum:** (Bahawalpur Board-2008)

- a) **Chlorophyta** b) Rhodophyta c) Phaeophyta d) Pyrrophyta
- 3) **Feeding stage of slime mold is: (Bahawalpur Board-2009)**
 a) Mycelium b) Hyphae c) **Plasmodium** d) Pseudopodium
- 4) **The vector in African Sleeping Sickness is: (Bahawalpur Board-2010)**
 a) House fly b) **TseTse fly** c) Fruit fly d) Butterfly
- 5) **Giants of the Protist Kingdom are included: (Bahawalpur Board-2011)**
 A) Green Algae B) Red Algae
 C) **Brown Algae** D) Diatoms
- 6) **Most ciliates are capable of sexual process called: (Bahawalpur Board-2012)**
 A) Oogamy B) Mating C) **Conjugation** D) Plasmogamy
- 7) **John Hogg proposed the kingdom: (Bahawalpur Board-2013)**
 A) Monera B) Fungi C) Fungi D) **Protoctista**

Dera Ghazi Khan Board

- 1) **Multi-cellular giants of protest kingdom are included in: (Dera Ghazi Khan Board-2008)**
 a) **Brown algae** b) Diatoms c) Apicomplexans d) Zooflagellates
- 2) **Pseudopodia are present in: (Dera Ghazi Khan Board-2009)**
 a) Amoeba b) Actinopods c) Foraminiferans d) **All of these**
- 3) **The cause of malaria is: (Dera Ghazi Khan Board-2010)**
 a) *Trypanosoma* b) **Plasmodium** c) *Amoeba* d) *Paramecium*
- 4) **Who proposed kingdom Protista for microscopic organisms? (Dera Ghazi Khan Board-2011)**
 A) Whittikar B) **John Hogg**
 C) H. Copeland D) Haeckel
- 5) **Which are the major Producers in Aquatic System? (Dera Ghazi Khan Board-2012)**
 A) Green Algae B) **Diatoms** C) Slime Molds D) Ferns

Lahore Board

- 1) **Which are the major producers in aquatic ecosystem? (Lahore Board-2004)**
 a) Green algae b) **Diatoms** c) Euglenoids d) Red algae
- 2) **Feeding stage of slime mold is: (Lahore Board-2005)**
 a) Blastostyle b) Gastrozoid c) **Plasmodium** d) Sporozoite
- 3) **Which of the following causes sleeping sickness? (Lahore Board-2008)**
 a) Trichoymphas b) **Trypanosoma** c) Choanoflagellates d) None of these
- 4) **Parasitic protozoan that form spores at some stage in their life belong to: (Lahore Board-2009)**
 a) Ciliates b) Zooflagellates c) **Apicomplexans** d) Actinopods
- 5) **Amebic dysentery is caused by: (Lahore Board-2010)**
 a) *Amoeba* b) **Entamoeba** c) *Vorticella* d) *Plasmodium*
- 6) ***Pleomyxa palustris* is: (Lahore Board-2011)**

- A) Bacterium B) **Amoeba** C) Ciliate D) Zooflagellate
- 7) **Which one of the following is not a ciliate? (Lahore Board-2012)**
 A) *Paramecium* B) *Vorticella* C) ***Trypanosoma*** D) *Stentor*
- 8) ***Ceratium* belongs to: (Lahore Board-2012)**
 A) **Pyrrophyta** B) Chrysophyta C) Phaeophyta D) Rhodophyta
- 9) **Mosquitoes infect *Plasmodium* to human in the form of: (A-2013-Group I)**
 A) Cysts B) **Sporozoites** C) Merozoites D) Gametocytes
- 10) **Sleeping sickness is spread by: (A-2013-Group II)**
 A) **Tsetse fly** B) *Trypanosoma* C) Mosquito D) *Plasmodium*

Gujranwala Board

- 1) **The Tse-Tse fly of African countries transmits *Trypanosoma*, the cause of:**
 (Gujranawala Board-2006)
 a) **Sleeping sickness** b) Skin diseases d) Lung infection d) Both a and b
- 2) **Amoebae move and obtain food by means of: (Gujranawala Board-2006)**
 a) Plasmodium b) Flagella c) Cilia **d) Pseudopodia**
- 3) **The closest relatives of fungi are probably: (Gujranawala Board-2006)**
 a) Aschelminthes b) Diatoms **c) Slime molds** d) Ferns
- 4) **Algae which have shells composed of two halves that fit together like Petri dish belong to: (Gujranawala Board-2007)**
 a) Brown algae **b) Diatoms** c) Green algae d) Red algae
- 5) **Amoeba moves and obtains food by means of: (Gujranawala Board-2007)**
 a) Tentacles **b) Pseudopodia** c) Cilia d) Flagella
- 6) **Chlorella is: (Gujranawala Board-2009)**
 a) Multicellular b) Acellular
 c) Unicellular motile **d) Unicellular non-motile**
- 7) **African Sleeping Sickness is caused by: (Gujranawala Board-2010)**
 a) ***Trypanosoma*** b) *Entamoeba*
 c) *Plasmodium* d) *Stentor*
- 8) **Algae which take part in building coral reefs along with coral animals: (Gujranwala Board-2011)**
 A) Diatoms **B) Red Algae** C) Green Algae D) Brown Algae
- 9) **Common name for Pyrrophyta is: (Gujranwala Board-2012)**
 A) Euglenoids B) Diatoms **C) Dinoflagellates** D) Brown algae
- 10) **Which is not included in chlorophyta? (A-2013)**
 A) *Chlorella* **B) *Pinnularia*** C) *Spirogyra* C) *Acetabularia*

Rawalpindi Board

- 1) The scientific name of giant amoeba is: (Rawalpindi Board-2010)
 a) *Entamoeba histolytica* b) *Amoeba proteus*
 c) ***Pelomyxa palustris*** d) *Vorticella*
- 2) The feeding stage of a slime mold is: (Rawalpindi Board-2011)
 A) Plasmodium B) Pseudopodium C) Mycelium D) Hyphae
- 3) Example of Apicomplexans is: (Rawalpindi Board-2012)
 A) ***Plasmodium*** B) *Amoeba* C) *Stentor* D) *Trypanosoma*
- 4) Tests of foraminifera are made of: (A-2013)
 A) Iron B) **Calcium** C) Silica D) Spongin

Sargodha Board

- 1) **The feeding stage of a slime mold is: (Sargodha Board-2005)**
a) Blastostyle b) Gastrozooids **c) Plasmodium** d) Sporozoite
- 2) **Tests of feraminifera are made up of: (Sargoha Board-2010)**
a) Calcium b) Silica c) Oxalate d) Magnesium
- 3) **Which one structure is not present in protests? (Sargodha Board-2011)**
A) Flagella **B) Embryo** C) Cilia D) Chlorophyll
- 4) **Most ciliates are capable of sexual process called: (Sargodha Board-2012)**
A) Oogamy B) Mating **C) Conjugation** D) Copulation
- 5) **Which one of the following is not a ciliate? (A-2013)**
A) *Stentor* **B) Trypanosoma** C) *Paramecium* D) *Vorticella*

Faislabad Board

- 1) **Amoebas move and obtain food by means of:** (Faislabad Board-2007)
a) Flagella b) Plasmodium c) **Pseudopodia** d) Cilia
- 2) **Amoebas move and obtain food by means of:** (Faislabad Board-2008)
a) Plasmodium b) Flagella c) Cilia d) **Pseudopodia**
- 3) **The sexual process exhibited by most ciliates is called:** (Faislabad Board-2009)
a) Binary fission b) **Conjugation** c) Oogamy d) Fertilization
- 4) **The intestinal parasite causes amebic dysentery in humans is:** (Faislabad Board-2010)
a) Trichonymphas b) *Pelomyxa pelustris*
c) ***Entamoeba histolytica*** d) Apicomplexans
- 5) **The scientific name of giant amoeba is:** (Rawalpindi Board-2010)
a) *Entamoeba histolytica* b) *Amoeba proteus*
c) ***Pelomyxa palustris*** d) *Vorticella*
- 6) **Which one is member of Chrysophyta?** (Faislabad Board-2011)
A) *Ceratium* B) *Macrocystis*
C) *Polysiphonia* D) ***Pinnularia***
- 7) **Algae which take part in building coral reefs along with coral animals are:**
(Faislabad Board 2012)
A) **Red algae** B) Brown algae C) Green algae D) Diatoms
- 8) **The feeding stage of slime mold is called:** (A-2013)
A) **Plasmodium** B) Pseudopodium C) Endocytosis D) Seizing

Chapter No: 8 1 MCQ
Multan Board

- 1) **Cell wall of fungi contains: (Multan Board-1st Annual 2007)**
a) Cellulose b) **Chitin** c) Calcium carbonate d) None of these
- 2) **Carcinogenic mycotoxins called Aflatoxins are produced by: (Model Paper of Multan Board-2006-2008)**
a) ***Aspergillus*** b) *Penicillium* c) *Neurospora* d) *Ustilago*
- 3) ***Saccharomyces cerevecae* is the most exploited: (Multan Board-1st Annual 2008)**
a) Rust b) Brown mold c) Green mold d) **Yeast**
- 4) **Histoplasmosis is a disease of: (Multan Board-2nd Annual 2008)**
a) Eyes b) Stomach c) **Lungs** d) None of these
- 5) **These are ecologically important as bio-indicators of Air Pollution: (Multan Board-1st Annual 2009)**
a) Yeasts b) **Lichens** c) Mycorrhizae d) Viruses
- 6) **Mutualistic association between certain fungi and roots of vascular plants is: (Multan Board-2nd Annual 2009)**
a) Lichen b) **Mycorrhizae** c) Arthrobotrys d) None of these
- 7) **Poisonous mushrooms are called: (Multan Board-1st Annual 2010)**
a) Truffles b) Morels c) **Toad stools** d) Agaricus
- 8) **Imperfect fungi show special kind of genetic recombination in which portions of chromosomes of two nuclei in the same hypha are exchanged: (Multan Board-2nd Annual 2010)**
A) Sexuality B) **Parasexuality** C) Conjugation D) Transduction
- 9) **The major structural component of fungus cell wall is: (Multan Board-(A) 2011)**
A) Cellulose B) Lignin C) **Chitin** D) Renin
- 10) **Reindeer moss is a: (Multan Board-(S) 2011)**
A) Moss B) Mycorrhiza C) Algae D) **Lichen**
- 11) **Fungi reproduce asexually by means of: (Multan Board-(A) 2012)**
A) Spores B) Conidia C) Budding D) **All of these**
- 12) **The skeleton of arthropoda is made of: (Model Paper of Multan Board Session 2012-2013 and onward)**
A) Cellulose B) **Chitin** C) Polysaccharide D) Lignin
- 13) **Citric acid is obtained from some species of: (Multan Board-1st Annual 2013)**
A) ***Aspergillus*** B) *Penicillium* C) *Saccharomyces* D) *Neurospora*

Bahawalpur Board

- 1) **Which of these structures are associated with asexual reproduction? (Bahawalpur Board-007)**
a) Ascospore b) Basidiospore c) Zygosporangium d) **Conidia**
- 2) **Which of the following does not produce conidia? (Bahawalpur Board-2008)**
a) **Zygomycota** b) Deuteromycota c) Ascomycota d) None of these
- 3) **Deuteromycetes lack: (Bahawalpur Board-2009)**

- a) Mycelium reproduction
b) Asexual reproduction
c) Spores reproduction
d) Sexual reproduction
- 4) **Histoplasmosis is a serious infection of:** (Bahawalpur Board-2010)
a) Liver b) Stomach c) Kidney d) Lungs
- 5) **The species of Edible Mushroom are about:** (Bahawalpur Board-2011)
A) 100 B) 200
C) 300 D) 400
- 6) ***Ustilago* species is most common:** (Bahawalpur Board-2012)
A) Rust fungi B) Yeasts C) Mold D) Smut fungi
- 7) **Which one of the following fungus is non-edible:** (Bahawalpur Board-2013)
A) Mushrooms B) Morels C) Toad Stools D) Truffles

Dera Ghazi Khan Board

- 1) **The relationship of Fungi with that of Lichen and Mycorrhizae is:** (Dera Ghazi Khan Board-2008)
a) Facultative parasitic b) **Mutualistic symbiotic** c) Parasitic
d) Predatory
- 2) **Histoplasmosis is a disease of:** (Dera Ghazi Khan Board-2009)
a) Eyes b) Stomach c) **Lungs** d) None of these
- 3) **Smut fungus belong to genus:** (Dera Ghazi Khan Board-2010)
a) ***Ustilago*** b) *Puccinia* c) *Alternaria* d) *Penicillium*
- 4) **Lovastatin is used in:** (Dera Ghazi Khan Board-2011)
A) **Lowering blood cholesterol** B) Organ transplant
C) Inhibiting fungal growth D) Headache
- 5) **In Fungi Asexual Reproduction takes place by:** (Dera Ghazi Khan Board-2012)
A) Conidia B) Fragemntation C) Budding **D) All these**

Lahore Board

- 1) Most of the visible part of lichen consists of: (Lahore Board-2005)
a) Algae b) Fungi c) Virus d) Bacteria
- 2) Lovastatin is the fungal product which lowers the blood: (Lahore Board-2006)
a) Sugar b) Urea c) Ca^{++} d) Cholesterol
- 3) Which of the following is major structural component of fungus cell wall? (Lahore Board-2007)
a) Cellulose b) Peptidoglycan c) Chitin d) Lignin
- 4) Histoplasmosis is: (Lahore Board-2008)
a) Heart disease b) Kidney disease c) Lung disease d) None of these
- 5) Brush like arrangement of its conidia is characteristics of: (Lahore Board-2009)
a) *Rhizopus* b) *Penicillium* c) *Ustilago* d) *Agaricus*
- 6) Citric acid is also obtained from some species of fungi called: (Lahore Board-2010)
a) *Agaricus* b) *Aspergillus* c) Yeast d) *Penicillium*
- 7) Deadly poisonous fungus is: (Lahore Board-2011)
A) *Agaricus* B) *Armillaria* C) *Morchella* D) *Amanita*

8) Which one of the following is used for lowering blood cholesterol?

(Lahore Board-2012)

- A) Grisofulvin B) Penicillin C) Cyclosporin D)

Lovastatin

9) Rust disease is caused by: (Lahore Board-2012)

- A) *Puccinia* B) *Aspergillus* C) Yeast D)

Ustilago

10) The ecologically important bio-indicator of air pollution are: (A-2013-Group I)

- A) Lichen B) Mycorrhizae C) Yeast D) Viruses

11) The most common rust fungi are: (A-2013-Group II)

- A) *Ustilago* B) *Puccinia* C) *Penicillium* D) Yeast

Gujranwala Board

1) The mushrooms whose gills glow in the dark: (Gujranawala Board-2004)

- a) *Amanita verna* b) Truffles c) *Agaricus* d)

Omphalopus olearius

2) *Puccinia* species are most common: (Gujranawala Board-2005)

- a) Smut fungi b) Spitting fungi c) Bracket fungi d)

Rust fungi

3) The imperfect fungi is also called: (Gujranawala Board-2007)

- a) Basidiomycetes b) Ascomycetes c) **Deuteromycetes** d)

Zygomycetes

4) Fungi are heterotrophs that lack cellulose in their cell wall and contain a chemical found

in external skeleton of arthropods: (Gujranawala Board-2008)

- a) Cutin b) Lignin c) Pectin d) **Chitin**

5) Which is absent in fungi? (Gujranawala Board-2009)

- a) **Chlorophyll** b) Hyphae c) Glycogen d)

Chitin

6) The closest relatives of fungi are probably: (Gujranawala Board-2010)

- a) Animal b) **Slime mold** c) Brown algae d)

Vascular plants

7) The principal decomposers of cellulose and lignin are: (Gujranwala Board-2011)

- A) Bacteria B) Viruses C) **Fungi** D) Protozoans

8) Despite absence of sexual reproduction, imperfect fungi show special kind of sexual

reproduction called as: (Gujranwala Board-2012)

- A) Karyogamy B) Plasmogamy C) Conjugation D)

Parasexuality

9) Which is used to inhibit fungal growth? (A-2013)

- A) Lovastatin B) Cyclosporin C) **Griseofulvin** D) Ergotin

Rawalpindi Board

1) Oyster mushroom is considered as: (Rawalpindi Board-2010)

- a) Parasitic fungi b) Saprotrophic fungi
c) **Carnivorous fungi** d) Mycorrhizal fungi

2) The closest relatives of fungi are probably: (Rawalpindi Board-2011)

- A) Plants B) **Animals** C) Bacteria D) Brown algae

3) *Agaricus* are: (Rawalpindi Board-2012)

- A) Poisonous fungi B) **Edible fungi** C) Pathogenic fungi D)

Parasitic fungi

4) Fungi can tolerate a wide range of pH from: (A-2013)

- A) **2—9** B) 3—10 C) 4—11 D) 1—13

Sargodha Board

- 1) **Most of the visible part of lichen consists of:** (Sargodha Board-2005)
 a) Algae b) **Fungi** c) Roots d) Bacteria
- 2) **The chemical found in the external skeleton of arthropods is:** (Sargodha Board-2010)
 a) Cutin b) Suberin c) **Chitin** d) Lignin
- 3) **Lovastatin is used for:** (Sargodha Board-2011)
 A) Lowering blood pressure B) Removing germs
 C) **Lowering blood cholesterol** D) Lowering temperature
- 4) **Most of the visible part of Lichen consists of:** (Sargodha Board-2012)
 A) Algae B) **Fungi** C) Roots D) Bacteria
- 5) **Sexual reproduction is absent in:** (A-2013)
 A) **Deuteromycota** B) Basidiomycota C) Ascomycota D) Zygomycota

Faislabad Board

- 1) **Symbiotic association between fungi and algae is called:** (Faislabad Board-2007)
 a) Predator b) Parasite c) Autotroph d) **Lichens**
- 2) ***Penicillium* belongs to:** (Faislabad Board-2008)
 a) Basidiomycetes b) **Deuteromycetes** c) Ascomycetes d) Zygomycetes
- 3) **The cell wall of fungi contains:** (Faislabad Board-2009)
 a) Pectin b) Lignin c) Celulose d) **Chitin**
- 4) **Ecological role of fungi as decomposer is parallel only by:** (Faislabad Board-2010)
 a) Arthropoda b) **Bacteria** c) Algae d) Bryophytes
- 5) ***Ustilago* species is most common:** (Faislabad Board-2011)
 A) Rust Fungi B) **Smut Fungi**
 C) Yeast D) Mold
- 6) **Histoplasmosis is serious infection of:** (Faislabad Board 2012)
 A) Liver B) Stomach C) Kidney D) **Lung**
- 7) **Unicellular yeasts fungi reproduce asexually by:** (A-2013)
 A) Zygosporangia B) Conidia C) Spore formation D) **Budding**

Chapter No: 9 1 MCQ Multan Board

- 1) **The tracheophytes are further sub-divided into:** (Multan Board-1st Annual 2007)
 a) 3 sub-divisions b) 2 sub-divisions
 c) 8 sub-divisions d) **4 sub-divisions**
- 2) **The leaves are small having a single undivided vein is called:** (Multan Board-1st Annual 2007)
 a) Megaphylls b) **Microphylls** c) Blade d) Lamina
- 3) **The plants that have no vascular system, gametophyte dominant, sporophyte attached**

to gametophytes are known as: (Multan Board-2nd Annual 2007)

- a) Tracheophytes b) Bryophytes c) Gametophyte d)

Sporophyte

4) In *Anthoceros*'s sporophyte at the junction of foot and spore producing region, there is a band of:

(Model Paper of Multan Board-2006-2008)

- a) Paraphysis b) Meristematic tissue c) Phloem d)

Xylem

5) The megasporophylls bearing ovules are not folded and joined at the margins to form

an ovary: (Model Paper of Multan Board-2006-2008)

- a) Filicineae b) Monocotyledonae
c) Dicotyledonae d) Gymnospermae

6) A male gametophyte of an angiosperm is the: (Multan Board-1st Annual 2008)

- a) Anther b) Embryo sac c) Microspore d)

Germinating pollen grain

7) A heterosporous plant is one that: (Multan Board-1st Annual 2008)

- a) Produces a gametophyte that bears both sex organs
b) Produces Microspores and Megaspores in separate sporangia

giving rise to

separate Male and Female Gametophytes

- c) Is seedless vascular plant
d) Produces two kinds of spores one sexually by mitosis and one type by

meiosis

8) Whisk ferns belong to sub-division: (Multan Board-2nd Annual 2008)

- a) Psilopsida b) Lycopsida c) Sphenopsida d)

Pteropsida

9) A haploid spermatozoid fuses with a haploid egg to produce diploid:

(Multan Board-1st

Annual 2009)

- a) Spore b) Oospore c) Oosphere d) Gamete

10) The megaspore develops into female gametophyte of angiosperm, which consists of:

(Multan Board-1st Annual 2009)

- a) 8 cells b) 2 cells c) 7 cells d) 3

cells

11) The reproductive organ of sporophyte is: (Multan Board-2nd Annual 2009)

- a) Sporangium b) Sparangium c) Anthridium d)

Archegonium

12) Selaginella resemble seed producing plants because of: (Multan Board-2nd Annual 2009)

- a) Homosporous b) Homogamous c) Heterosporous d)

Heterogamous

13) *Lycopersicum esculentura* belongs to: (Multan Board-1st Annual 2010)

- a) Cruciferae b) Fabaceae c) Solanaceae d)

Poaceae

14) All seed producing plants are called: (Multan Board-(S) 2010)

- A) Rhodophyta B) Bryophyta C) Pteridophyta D)

Spermatophyta

15) Rootless sporophyte is found in: (Multan Board-(A) 2011)

- A) Psilopsida B) Lycopsida C) Sphenopsida D)

Pteropsida

16) An ovule is an integumented indehiscent: (Multan Board-(S) 2011)

- A) Megasporangium B) Microsporangium C) Embryo sac

D) Seed

17) Which one of the following is termed as horsetail? (Multan Board-(A) 2012)

- A) Lycopsida B) Sphenopsida C) Pteropsida D)

Psilopsida

18) Which one of the following is called Sago Palm? (Multan Board-(A) 2012)

- A) Pinus B) Cycas C) Cedrus D) Picea
- 19) **Unequal development of various branches during evolution of leaf is:**
(Model Paper of Multan Board Session 2012-2013 and onward)
- A) Webbing B) Fusion C) **Overtopping** D) Planation
- 20) ***Capsicum frutescens* belongs to family:** (Multan Board-1st Annual 2013)
- A) Rosaceae B) **Solanaceae** C) Fabaceae D) Mimosaceae

Bahawalpur Board

- 1) **In anthoceros sporophyte at the junction of foot and spore producing region there is a band of:** (Bahawalpur Board-2007)
- a) Paraphysis b) **Meristematic tissue** c) Phloem d) Xylem
- 2) **The arrangement of unequal dichotomies in one plane is termed as:** (Bahawalpur Board-2007)
- a) Venation b) Overtopping c) **Planation** d) Network
- 3) **Strobilus is the reproductive structure of:** (Bahawalpur Board-2008)
- a) ***Selaginella*** b) *Equisetum* c) *Psilotum* d) *Rhynia*
- 5) ***Triticum* is a member of:** (Bahawalpur Board-2008)
- a) **Poaceae** b) Solanaceae c) Rosaceae d) Fabaceae
- 6) **In one of the following is present Circinate Vernation:** (Bahawalpur Board-2009)
- a) **Ferns** b) Cycas c) Both a and b d) None of these
- 7) **The male gametophyte of an angiosperm is:** (Bahawalpur Board-2009)
- a) Anther b) Embryo sac c) Microspore d) **Germinated pollen grain**
- 8) **A flower is modified:** (Bahawalpur Board-2010)
- a) Stem b) **Shoot** c) Leaf d) Root
- 9) **Pulses belong to the following family:** (Bahawalpur Board-2011)
- A) Rosaceae B) Solanaceae
C) **Fabaceae** D) Poaceae
- 10) **Sphenopsida are commonly called:** (Bahawalpur Board-2013)
- A) Whisk ferns B) **Horsetails** C) Club Mosses D) Horn Worts

Dera Ghazi Khan Board

- 1) **The male gametophyte of an angiosperm is:** (Dera Ghazi Khan Board-2008)
- a) Anther b) **Germinated pollen grain** c) Microspore d) Ovule
- 2) **Evolution of heterospory led to the evolution of:** (Dera Ghazi Khan Board-2008)
- a) Leaves b) Root c) Scales d) **Seeds**
- 3) **Atropine is obtained from a plant which belongs to:** (Dera Ghazi Khan Board-2009)
- a) Rosaceae b) **Solanaceae** c) Fabaceae d) Poaceae
- 4) **Heterospory is the production of two types of:** (Dera Ghazi Khan Board-2009)
- a) Gametes b) **Spores** c) Sperms d) Eggs

- 5) ***Anthoceros* is commonly called:** (Dera Ghazi Khan Board-2010)
 a) Moss b) Hair cap moss c) **Hornwort** d) Liverwort
- 6) **The biological name of sweet pea is:** (Dera Ghazi Khan Board-2011)
 A) *Archis hypogea* B) *Solanum nigrum*
 C) ***Lathyrus odoratus*** D) *Lycopersicum esculentum*
- 7) **A flower is a modified:** (Dera Ghazi Khan Board-2012)
 A) Stem B) **Shoot** C) Leaf D) Root
- 8) **Endosperm of Angiosperm is:** (Dera Ghazi Khan Board-2012)
 A) 1 N B) 2 N C) **3 N** D) 4 N

Lahore Board

- 1) ***Clitoria ternatea* is used against:** (Lahore Board-2005)
 a) Dog bite b) Insect bite c) Horse bite d) **Snake bite**
- 2) **Female gametophyte in angiosperm is also called:** (Lahore Board-2007)
 a) Archegonium b) Ovary c) Seed d) **Embryo sac**
- 3) **The common name of *Allium cepa* is:** (Lahore Board-2007)
 a) **Piyaz** b) Bathu c) Amaltas d) Chana
- 4) **Vascular plants are:** (Lahore Board-2008)
 a) Bryophytes b) Embryophytes c) **Tracheophytes** d) None of these
- 5) **The biological name of Amaltas is:** (Lahore Board-2008)
 a) *Cassia senna* b) *Bauhinia variegata* c) ***Cassia fistula*** d) None of these
- 6) **The period in which first complete seed plant appeared is:** (Lahore Board-2009)
 a) **Devonian** b) Permian c) Silurian d) Carboniferous
- 7) **The fruit of leguminosae:** (Lahore Board-2009)
 a) **Legume** b) Pod c) Caryopsis d) Berry
- 8) **In spermatophytes, seed is formed from:** (Lahore Board-2010)
 a) Ovary b) **Ovule** c) Anther d) Embryo sac
- 9) **Tomato and potato belong to family:** (Lahore Board-2011)
 A) Poaceae B) Rosaceae C) **Solanaceae** D) Mimosaceae
- 10) **Which one of the following is not extinct?** (Lahore Board-2012)
 A) *Horneophyton* B) ***Psilotum*** C) *Psilophyton* D) *Cooksonia*
- 11) ***Arachis hypogea* belongs to:** (Lahore Board-2012)
 A) Rosaceae B) Solanaceae C) **Fabaceae** D) Caesalpiaceae
- 12) **Which one is used against snake bite?** (Lahore Board-2012)
 A) *Glycyrrhiza galbra* B) *Abrus precacatorious*
 C) ***Clitoria ternatea*** D) *Indigofera tinctoria*
- 13) **The scientific name for peanut is:** (Lahore Board-2012)
 A) *Lathyrus odoratus* B) ***Arachis hypogea***
 C) *Dalbergia sisso* C) *Tamarindus indica*
- 14) **The first complete seed appeared in the period:** (A-2013-Group I)
 A) **Late Devonian** B) Cambrian C) Permian D) Jurassic

- 15) **Pulses producing plants belong to: (A-2013-Group II)**
 A) Rosaceae B) Solanaceae C) **Fabaceae** D) Poaceae

Gujranwala Board

- 1) **A haploid spermatozoid (antherozoid) fuses with the haploid egg of oosphere to produce: (Gujranwala Board-2004)**
 a) Haploid oospore b) **Zygote** c) Diploid oospore d) Both b and c
- 2) **Solanaceae has plant: (Gujranwala Board-2007)**
 a) ***Solanum tuberosum*** b) *Pyrus*
 c) *Lathyrus odoratus* d) *Tamarandus indica*
- 3) **The male gametophyte of angiosperm is: (Gujranwala Board-2008)**
 a) Anther b) Microspore c) **Germinated pollen grain** d) Megaspore
- 4) **Heterospory is the production of two types of: (Gujranwala Board-2008)**
 a) Gametes b) **Spores** c) Sperms d) Eggs
- 5) **Megaspore within megasporangium develops into: (Gujranwala Board-2009)**
 a) Ovule b) Fruit c) Ovary d) **Embryo sac**
- 6) **Prothallus is: (Gujranwala Board-2009)**
 a) Sporophyte b) Saprophyte c) **Gametophyte** d) Seed
- 7) ***Cassia fistula* belongs to family: (Gujranwala Board-2010)**
 a) Solanaceae b) Poaceae c) **Caesalpiniaceae** d) Rosaceae
- 8) ***Pyrus* (pear) belongs to the family: (Gujranwala Board-2011)**
 A) **Rosaceae** B) Poaceae C) Solanaceae D) Fabaceae
- 9) **Which one belongs to Bryopsida? (Gujranwala Board-2012)**
 A) *Marchentia* B) *Porella* C) *Anthoceros* D) ***Polytrichum***
- 11) **Sugar is obtained from the juice of: (Gujranwala Board-2012)**
 A) *Oryza sativa* B) *Hordium vulgare*
 C) *Sorghum vulgare* D) ***Saccharum officinarum***
- 12) **Living genus of Psilopsida is: (A-2013)**
 A) Cooksonia B) Psilophyton C) Horneophyton D) **Psilotum**

Rawalpindi Board

- 1) **Bryophytes are generally thought to have evolved from: (Rawalpindi Board-2010)**
 a) Brown algae b) Red algae c) **Green algae** d) Golden algae
- 2) **Family Rosaceae has genera in Pakistan: (Rawalpindi Board-2010)**
 a) 27 b) **29** c) 31 d) 33
- 3) **Horsetails belong to sub-division: (Rawalpindi Board-2011)**
 A) Lycopsida B) Psilopsida C) **Sphenopsida** D) Pteropsida
- 4) **Scientific name of Shisham is: (Rawalpindi Board-2012)**
 A) *Capsicum annum* B) ***Dalbergia sisso*** C) *Cassia fistula* D) *Zea mays*
- 5) **Double fertilization is a special process found in: (Rawalpindi Board-2012)**
 A) Ferns B) Bryophytes C) Gymnosperms D) **Angiosperms**
- 6) **The simplest of all bryophytes are: (A-2013)**
 A) Mosses B) Hornworts C) **Liverworts** D) Whisk ferns

Sargodha Board

- 1) The system of classification which reflects the natural relationship among living organisms and their mode of origin is: (Sargodha Board-2010)
a) Natural b) **Phylogenetic** c) Artificial d) Modern
- 2) *Marchantia* is an example of: (Sargodha Board-2011)
A) Bryopsida B) Lycopsidea C) **Hepaticopsida** D) Anthoceropsidea
- 3) *Clitoria ternatea* is used against: (Sargodha Board-2012)
A) Dog bite B) Insect bite C) Horse bite D) **Snake bite**
- 4) *Arachis hypogea* belongs to family: (A-2013)
A) Rosaceae B) Solanaceae C) **Fabaceae** D) Mimosaceae

Faislabad Board

- 1) The sporangia with one kind of spores are called: (Faislabad Board-2007)
a) Anthridia b) **Homosporous** c) Heterosporous d) Diploid embryo
- 2) The male gametophyte of an angiosperm is the: (Faislabad Board-2007)
a) Anther b) Ovule c) Embryo sac d) **Germinating pollen grain**
- 3) Flowering plants belong to the class: (Faislabad Board-2008)
a) **Angiospermae** b) Gymnospermae c) Filicineae d) None of these
- 4) Which of the plants are said to be amphibians of the plant world? (Faislabad Board-2009)
a) Pteridophytes b) **Bryophytes** c) Tracheophytes d) Spermatophytes
- 5) In bryophytes the sporophyte generation is: (Faislabad Board-2009)
a) Haploid b) **Diploid** c) Triploid d) None of these
- 6) Circinate vernation refers to: (Faislabad Board-2010)
a) Leaf venation b) Leaf arrangement of the stem
c) **Development pattern of leaf** d) Fertilization process
- 7) The leaves of *Cassia alata* are used to cure: (Faislabad Board-2011)
A) Snake bite B) Cough and fever
C) Cough and cold D) **Ringworm**
- 8) Family of Sweet Pea is: (Faislabad Board 2012)
A) **Fabaceae** B) Solanaceae C) Rosaceae D) Poaceae
- 9) The term lodicule refers to: (Faislabad Board 2012)
A) Bract B) Bracteoles C) **Perianth** D) Calyx
- 10) The process of evolution of leaf was completed in more than million years: (A-2013)
A) 10—15 B) **15—20** C) 20—25 D) 10—12

Chapter No: 10 2 MCQs Multan Board

- 1) **Example of Placental mammal is: (Multan Board-1st Annual 2007)**
 a) Parcopine b) **Bat** c) Kangaroo d) None of these
- 2) **The earliest fossil bird is: (Multan Board-1st Annual 2007)**
 a) Cotyolosaur b) **Archeopteryx** c) Dinosaur d) None of these
- 3) **The body cavity of Nematoda: (Model Paper of Multan Board-2006-2008)**
 a) Blastocoel b) Haemocoel c) Spongocoel d) **Pseudocoelom**
- 4) **Fish show modification of aquatic breathing system to meet the conditions of terrestrial life by developing lungs: (Model Paper of Multan Board-2006-2008)**
 a) Hag fish b) Dog fish c) **Dipnoi** d) Shark
- 5) **The animal having both male and female reproductive organs in the same individual is called: (Multan Board-1st Annual 2008)**
 a) Fraternal twin b) **Hermaphrodite** c) Gonadomorph d) Hybrids
- 6) **In annelids excretion takes place by special structures called: (Multan Board-1st Annual 2007)**
 a) Kidneys b) Malpighian tubules c) Flame cells d) **Nephridia**
- 7) **In animals reproductive organs develop from: (Multan Board-2nd Annual 2008)**
 a) Endoderm b) **Mesoderm** c) Ectoderm d) None of these
- 8) **Pin worm belongs to Phylum: (Multan Board-2nd Annual 2008)**
 a) Platyhelminthes b) **Aschelminthes** c) Annelida d) Arthropoda
- 9) **Mammals have evolved from Reptilian ancestor known as: (Multan Board-1st Annual 2009)**
 a) **Cotylosaurs** b) Archeopetryx c) Echidna d) Opossum
- 10) **Excretory organs in Arthropods are: (Multan Board-1st Annual 2009)**
 a) Nephridia b) Kidneys c) **Malapighian tubules** d) All these
- 11) **The animals, which do not have a body cavity, have been grouped under: (Multan Board-2nd Annual 2009)**
 a) Pseudocoelomata b) Coelomata c) **Acoelomata** d) None of these
- 12) **The presence of notochord is the character of: (Multan Board-2nd Annual 2009)**
 a) Arthropoda b) Echinodermata c) Porifera d) **Chordata**
- 13) **A free swimming trochophore larva is produced during the life cycle of: (Multan Board-1st Annual 2010)**
 a) Arthropoda b) Porifera c) Coelenterata d) **Annelida**
- 14) **In birds organs of voice is called: (Multan Board-(S) 2010)**
 A) **Syrinx** B) Larynx C) Pharynx D) Bronchi
- 15) **Parapodia are the organs of locomotion in: (Multan Board-(A) 2011)**
 A) Leech B) Earthworm C) Planaria D) **Neries**
- 16) **Commercially shark liver oil is extracted and used in medicine as a source of: (Multan Board-(S) 2011)**
 A) Fatty acid B) Vitamin A and B
 C) Vitamin K D) **Vitamin A and D**
- 17) **Marsupium is the characteristic feature of: (Multan Board-(A) 2012)**
 A) **Opossum** B) Echidna C) Duckbill Platypus D) Dolphin
- 18) **Placoids are absent in: (Multan Board-(A) 2012)**
 A) Sharks B) Skates C) Rays D) **Trout**

- 19) **The asexual reproduction in Sponges is:** (Multan Board-(S) 2012)
 A) Fragmentation **B) Budding** C) Binary fission D) Multiple fission
- 20) **Scorpion belongs to class:** (Multan Board-(S) 2012)
 A) Crustacea B) Insecta **C) Arachnida** D) Myriapoda
- 21) **Which one of the following is not included in amniota?** (Multan Board-1st Annual 2013)
 A) Mammals B) Reptiles **C) Amphibians** D) Aves
- 22) **Which one of the following is a motile coelenterate?** (Multan Board-1st Annual 2013)
 A) **Jelly fish** B) *Obelia* C) Sea anemone D) *Hydra*

Bahawalpur Board

- 1) ***Trypanosoma* causes the disease:** (Bahawalpur Board-2007)
 a) Malaria b) Aids **c) Sleeping Sickness** d) None of these
- 2) **Cuttle fish belongs to:** (Bahawalpur Board-2007)
 a) Arthropoda b) Echinodermata **c) Mollusca** d) Pisces
- 3) **Left Aortic Arch is the characteristic feature of:** (Bahawalpur Board-2008)
 a) Amphibians b) Birds c) Reptiles **d) Mammals**
- 4) ***Pheretima posthuma* belongs to phylum:** (Bahawalpur Board-2008)
 a) Nematoda b) Arthropoda c) Mollusca **d) None of these**
- 5) **Blood of arthropods is:** (Bahawalpur Board-2009)
 a) Green colored b) Red colored c) Brown colored **d) Colorless**
- 6) **The individual members of coelenterate colony are:** (Bahawalpur Board-2009)
 a) Polyp b) Medusa **c) Zooids** d) Gastropods
- 7) **In Protostomes, the blastopore forms the:** (Bahawalpur Board-2010)
a) Mouth b) Brain c) Anus d) Excretory pore
- 8) **In animals, reproductive system develops from:** (Bahawalpur Board-2011)
 A) Mesenchyma B) Ectoderm
 C) Endoderm **D) Mesoderm**
- 9) **Syrinx is organ of voice in:** (Bahawalpur Board-2012)
A) Birds B) Reptiles C) Mammals D) Amphibians
- 10) **In annelids the organs for excretion are:** (Bahawalpur Board-2012)
 A) Flame cells B) Protonephridia **C) Nephridia** D) Nephrons
- 11) **The second largest phylum of invertebrates is:** (Bahawalpur Board-2013)
 A) Annelida **B) Mollusca** C) Echinodermata D) Platyhelminthes
- 12) **Which is the largest group not only of Arthropoda but of all the animal kingdom:** (Bahawalpur Board-2013)
 A) Class Myriapoda B) Arachnida **C) Class Insecta** D) Crustacea

Dera Ghazi Khan Board

- 1) **Point out the phylum whose all members are marine:** (Dera Ghazi Khan Board-2008)
 a) Arthropoda **b) Echinodermata** c) Nematoda d) Protozoa
- 2) **In animals, the bodies can be divided into two equal halves in one plane is called:** (Dera Ghazi Khan Board-2009)
 a) Asymmetrical **b) Bilateral** c) Radial d) None of these

- 3) **In Animals Reproductive System develops from: (Dera Ghazi Khan Board-2009)**
 a) Endoderm **b) Mesoderm** c) Ectoderm d) None of these
- 4) **Diploblastic animals belong to division: (Dera Ghazi Khan Board-2010)**
 a) Protozoa b) Parazoa c) Echinodemata **d)**
- Radiata**
- 5) **In Annelida, the organs for excretion are: (Dera Ghazi Khan Board-2011)**
A) Nephridia B) Flame cells
 C) Protonephridia D) Nephrons
- 6) **Blood of Arthropoda is: (Dera Ghazi Khan Board-2012)**
 A) Green colored B) Red colored C) Brown colored **D)**
- Colorless**
- 7) **Syrinx is organ of voice in: (Dera Ghazi Khan Board-2012)**
 A) Amphibians **B) Birds** C) Reptiles D) Mammals

Lahore Board

- 1) ***Sepia* belongs to: (Lahore Board-2006)**
 a) Pisces b) Myriapoda c) Gastropoda **d)**
- Cephalopoda**
- 2) **Blue color respiratory pigment called haemocyanin is present in: (Lahore Board-2007)**
 a) Arthropoda **b) Mollusca** c) Annelida d) Echinodermata
- 3) **Organ of voice in birds is called: (Lahore Board-2007)**
 a) Vocal cord b) Larynx **c) Syrinx** d) Lipids
- 4) **The excretory system of arthropods is composed of: (Lahore Board-2008)**
a) Malapighian tubules b) Flame cells c) Nephridia d)
- Nephron**
- 5) **The pouched mammals are: (Lahore Board-2008)**
 a) Prototheria **b) Metatheria** c) Eutheria d) None of these
- 6) **Which is not related to other? (Lahore Board-2009)**
a) Kiwi b) Eagle c) Crow d) Pigeon
- 7) **Shark liver oil is source of: (Lahore Board-2009)**
 a) Antibiotics b) Food **c) Vitmin A and D** d) Vitamin B and C
- 8) **These animals have large canine: (Lahore Board-2010)**
a) Carnivores b) Detritivores c) Herbivores d) Omnivores
- 9) **Pseudocoelom is the characteristic feature of the phylum: (Lahore Board-2011)**
A) Nematoda B) Annelida C) Mollusca D)
- Echinodermata**
- 10) **Common name for *Ancylostoma duodenale* is: (Lahore Board-2012)**
A) Hook worm B) Pin worm C) Tape worm D)
- Earthworm**
- 11) **Which one of the following is included in tunicate? (Lahore Board-2012)**
 A) *Amphioxus* **B) Molgula** C) *Balanoglossus* D)
- Saccoglossus**
- 12) **The largest invertebrate animal is: (Lahore Board-2012)**
 A) Octopus **B) Squid** C) Anodonta D) Oyster
- 13) **The body cavity of Nematoda is: (A-2013-Group I)**
 A) Blastocoel **B) Pseudocoelom** C) Haemocoelom D)
- Coelom**
- 14) **The example of placental mammal is: (A-2013-Group I)**
A) Dolphin B) Kangaroo C) Echidna D) Opossum
- 15) **Matamerically segmented animals belong to: (A-2013-Group II)**
A) Annelida B) Cnidaria C) Mollusca D)
- Echinodermata**
- 16) **Mammals have evolved reptilian ancestor: (A-2013-Group II)**

- A) Archeopteryx **B) Cotylosaurs** C) Crocodile D) Tuatara

Gujranwala Board

- 1) **Round worms belong to: (Gujranawala Board-2004)**
a) Mollusca b) Annelida c) Arthropoda **d) Nematoda (Aschelminthes)**
- 2) **Animals that have their body cavity filled with parenchyma are: (Gujranawala Board-2007)**
a) Acoelomates b) Coelomates c) Pseudocoelomates d) Mesoderms
- 3) **In animals the bodies can be divided into two equal halves in one plane is called: (Gujranawala Board-2007)**
a) Asymmetrical **b) Bilateral** c) Radial d) None of these
- 4) **Mammals became dominant in: (Gujranawala Board-2009)**
a) Devonian period b) Silurian period
c) Cenozoic period d) Jurassic period
- 5) **Excretory structures in Annelida are: (Gujranawala Board-2009)**
a) Malapighian tubules b) Nephrons c) Flame cells **d) Nephridia**
- 6) **The excretory organ in phylum arthropoda is: (Gujranawala Board-2010)**
a) Flame cell b) Nephridia c) Kidney **d) Malpighian tube**
- 7) **Most spiders have eyes: (Gujranwala Board-2011)**
A) 2 B) 4 C) 6 **D) 8**
- 8) ***Balanoglossus* and *Saccoglossus* are common examples of: (Gujranwala Board-2012)**
A) Hemichordata B) Echinodermata C) Mollusca D) Annelida
- 9) **It is usually accepted by the biologists that mammals have evolved from reptilian ancestors called as: (Gujranwala Board-2012)**
A) Cotylosaurs B) Dinosaurs C) Cyclostoma D) Amphibians
- 10) **It is universally accepted by biologists that mammals have evolved from reptilian ancestors called: (A-2013)**
A) Dinosaurs **B) Cotylosaurs** C) Urochordata D) Hemichordata
- 11) **Common name for *Enterobius vermicularis* is: (A-2013)**
A) Hook worm B) Earth worm **C) Pin worm** D) Tape worm

Rawalpindi Board

- 1) **The phylum which is exclusively marine is: (Rawalpindi Board-2010)**
a) Protozoa b) Porifera c) Coelenterata **d) Echinodermata**
- 2) **The number of round worms in a single rotting apple is: (Rawalpindi Board-2010)**
a) 85000 b) 8000 c) 95000 **d) 90000**
- 3) **The best commercial sponges found in warm waters of: (Rawalpindi Board-2011)**
A) Pacific ocean B) Atlantic-ocean
C) Mediterranean ocean D) Indian ocean
- 4) **Mammals have evolved from reptilian ancestor known as: (Rawalpindi Board-2012)**
A) Dinosaurs B) Varanope **C) Cotylosaurs** D) Ichthyosaus
- 5) **Which of the following is placental mammal? (A-2013)**

- A) Platypus B) Bat C) Kangaroo D) Opossum
 6) **Pseudocoelom is present in: (A-2013)**
 A) Coelenterate B) Flat worms C) **Round worms** D) Segmented worms

Sargodha Board

- 1) **The animals which are on the boarder line between aquatic and true terrestrial animals belong to: (Sargodha Board-2010)**
 a) Reptilia b) Mammalia c) **Amphibian** d) Aves
 2) **The color of the blood of Molluscs is: (Sargodha Board-2011)**
 A) Red B) White C) Green D) **Blue**
 3) **Blastocoel persists throughout the life in: (Sargodha Board-2012)**
 A) Porifera B) Cnidaria C) Annelida D) **Nematoda**
 4) **Dolphin is: (Sargodha Board-2012)**
 A) Fish B) Bird C) Amphibian D) **Mammal**
 5) **Which one of the following is not a sub phylum of chordata? (A-2013)**
 A) Urochordata B) **Hemichordata** C) Cephalochordata D) Verteberata
 6) **Common name for *Ancylostoma duodenale* is: (A-2013)**
 A) Pin worm B) Tape worm C) Earth worm D) **Hook worm**

Faislabad Board

- 1) **Both male and female reproductive organs are present in the same individual is called:**
 (Faislabad Board-2007)
 a) **Hermaphrodite** b) Gonozoid c) Polymorphism d) Zooid
 2) **The animals which live in both aquatic and terrestrial conditions are called:**
 (Faislabad Board-2007)
 a) Reptile b) Annelida c) **Amphibians** d) Aves
 3) **The excretory organs in arthropods are: (Faislabad Board-2008)**
 a) Flame cells b) Nephridia c) Nephron d) **Malapighian tubules**
 4) **If larva resembles adult it is: (Faislabad Board-2008)**
 a) **Nymph** b) Bipinnaria c) Pupa d) None of these
 5) ***Ascaris lumbricoides* is an intestinal parasite of: (Faislabad Board-2009)**
 a) Monkeys b) Horse c) Camel d) **Man**
 6) **Jointed appendages are found in phylum: (Faislabad Board-2009)**
 a) Mollusca b) Annelida c) **Arthropoda** d) Cnidaria
 7) **The cleavage in which the lines or planes of cleavage are asymmetrical between poles is:**
 (Faislabad Board-2010)
 a) Radial and determinate b) **Spiral and determinate**
 c) Radial and indeterminate d) Spiral and pre-determinate
 8) **Mammals became dominant in which period? (Faislabad Board-2011)**
 A) **Cenozoic** B) Jurassic
 C) Devonian D) Ordovician
 9) **Mammals became dominant in: (Faislabad Board 2012)**
 A) Mesozoic period B) **Cenozoic period**
 C) Palaeozoic period D) Jurassic period
 10) **In the Protostomes, the blastopore forms the: (Faislabad Board 2012)**
 A) **Mouth** B) Brain C) Anus D) Excretory pore
 11) **In most sponges the outer layer of body wall is made up of cells called: (A-2013)**

- A) Choanocytes B) Pinacoderm C) Choanoderm **D)**

Pinacocytes

12) In birds the organ of voice is called: (A-2013)

- A) Larynx **B) Syrinx** C) Vocal cords D) Para bronchi

Chapter No: 11 2 MCQs
Multan Board

1) In the first step of Citric Acid Cycle, Acetyl CoA reacts with Oxaloacetate to form:

(Multan Board-1st Annual 2007)

- a) Pyruvate **b) Citrate** c) NADH d) ATP

2) The process by which a pH gradient comes across the membranes derives the

formation of ATP: (Model Paper of Multan Board-2006-2008)

- a) **Chemiosmosis** b) Chemosynthesis
c) Photosynthesis d) Carbon fixation

3) Glycolysis: (Multan Board-1st Annual 2008)

- a) Produces no ATP.
b) Is same as fermentation.
c) Takes place in Mitochondria.
d) Produces two molecules of NAD for every glucose molecule

processed.

4) The number of chloroplasts in each mesophyll cell is about: (Multan Board-2nd Annual 2008)

- a) **20-100** b) 1200 c) Half a million d) 200

5) In respiratory chain NADH is oxidized by: (Multan Board-1st Annual 2009)

- a) Cytochrome b **b) Coenzyme Q** c) Oxygen d) None

6) Oxidative phosphorylation takes place in conjunction with the respiratory chain

in the inner membrane of: (Multan Board-2nd Annual 2009)

- a) **Mitochondrion** b) Chloroplast c) Golgi body d)

Lysosome

7) Oxygen released during photosynthesis comes from: (Multan Board-1st Annual 2010)

- a) **Water** b) CO₂ c) Glucose d) Chlorophyll

8) Synthesis of ATP in the presence of oxygen is called: (Multan Board-(S) 2010)

- A) Oxidation **B) Oxidative**

Phosphorylation

- C) Phosphorylation D) Photophosphorylation

9) The most abundant protein in chloroplasts and probably most abundant protein on

earth is: (Multan Board-(S) 2010)

- A) Hemoglobin **B) Rubisco** C) Insulin D) Myosin

10) A great deal of energy is released during: (Multan Board-(A) 2011)

- A) **Respiration** B) Reproduction
C) Photosynthesis D) Excretion

11) The quantitative study of energy relationships and energy conversion in biological

systems is: (Multan Board-(A) 2011)

- A) Biotechnology **B) Bioenergetics** C) Biochemistry D)

Biophysics

12) The first action spectrum was obtained by Engelmann in 1883 by working on:

(Multan Board-(S) 2011)

- A) ***Spirogyra*** B) *Nostoc* C) *Chlorella* D) *Euglena*

- 13) Dark reaction takes place in: (Multan Board-(S) 2011)**
 A) Matrix of Mitochondria B) Grana of Chloroplast
 C) **Stroma of Chloroplast** D) Cytoplasm of Mesophyll
- 14) Iron containing protein is: (Multan Board-(A) 2012)**
 A) **Cytochrome** B) Ferredoxin C) Plastocyanin D) Plastoquinin
- 15) Oxygen produced during photosynthesis comes from: (Model Paper of Multan BoardSession 2012-2013 and onward)**
 A) CO₂ B) **H₂O** C) NADP D) NAD
- 16) The colour of Xynthophylls is: (Model Paper of Multan BoardSession 2012-2013 and onward)**
 A) Blue B) Red C) Green D) **Yellow**
- 17) During respiratory chain coenzyme Q is oxidized by: (Multan Board-1st Annual 2013)**
 A) Cytochrome a₃ B) Cytochrome a
 C) **Cytochrome b** D) Cytochrome c
- 18) Which one of the following is not concerned with non-cyclic phosphorylation? (Multan Board-1st Annual 2013)**
 A) Plastoquinone B) Plastocyanin C) Ferredoxin D) **Isocitrate**

Bahawalpur Board

- 1) Thylakoid membranes are involved in ATP synthesis by: (Bahawalpur Board-2007)**
 a) **Chemeiosmosis** b) Osmosis c) Stroma d) Grana
- 2) The end product of anaerobic respiration in yeast is: (Bahawalpur Board-2008)**
 a) Pyruvic acid b) **Ethyl alcohol** c) Lactic acid d) Glucose
- 3) The percentage of CO₂ in air is:**
 a) 0.02-0.03 % b) **0.03-0.04 %** c) 0.4-0.6 % d) 0.05-0.09 %
- 5) Thylakoid membranes are involved in ATP synthesis by: (Bahawalpur Board-2010)**
 a) Chemosynhsis b) **Chemiosmosis** c) Chemotherapy d) Chemotaxis
- 6) The number of Chloroplast in each of Mesophyll Cell is about: (Bahawalpur Board-2011)**
 A) 20-200 B) **20-100** C) 10-100 D) 10-100
- 7) Chlorophyll "a" is found in all Photosynthetic Organisms except Photosynthetic: (Bahawalpur Board-2011)**
 A) Algae B) **Bacteria** C) Fungi D) Plants
- 8) Glycolysis occurs in: (Bahawalpur Board-2012)**
 A) Mitochondria B) Ribosomes C) Chloroplast D) **Cytosol**
- 9) Molecular formula for chlorophyll "b" is: (Bahawalpur Board-2013)**
 A) C₅₅H₇₂O₅N₁₄Mg B) **C₅₅H₇₀O₆N₄Mg**
 C) C₂₀H₃₉ D) C₆H₁₂O₆
- 10) The breaking of Terminal Phosphate of ATP releases energy about: (Bahawalpur Board-2013)**
 A) 7.8 K .Cal B) 7.00 K . cal C) 7.5 K . Cal D) **7.3 K . Cal**

Dera Ghazi Khan Board

1) An instrument that measures the relative ability of different pigments to absorb

different wave lengths of light is called: (Dera Ghazi Khan Board-2008)

- a) Electrocardiogram b) Photometer
c) Potometer **d)**

Spectrophotometer

2) **Magnesium, an important nutrient ion in plant, is essential component of:** (Dera Ghazi

Khan Board2009)

- a) Cell sap b) Protein c) **Chlorophyll** d)

Glucose

3) All life on planet earth is powered by: (Dera Ghazi Khan Board-2010)

- a) Chemical energy b) Solar energy
c) Electrical energy d) Atomic energy

4) **Glycolysis occurs in:** (Dera Ghazi Khan Board-2011)

- A) Mitochondria
C) Chloroplasts
- B) Ribosomes
D) Cytosol

5) **All life on planet earth is powered by:** (Dera Ghazi Khan Board-2011)

- A) Chemical Energy B) Solar Energy
C) Atomic Energy D) Electrical Energy

6. Which is not Accessory Pigment? (Dera Ghazi Khan Board-2012)

- A) Chlorophyll a** B) Chlorophyll b C) Xanthophylls D)

Carotene

Lahore Board

1) Chlorophyll absorbs mainly wavelengths of: (Lahore Board-2004)

- a) Green color b) Yellow color c) Indigo color **d) Violet-color**

2) Which of following is not an accessory pigment? (Lahore Board-2007)

- a) Chlorophyll-a** b) Chlorophyll-b c) Xynthophyll d)

Carotenoid

3) The quantitative study of energy relationship in the biological system is: (LahoreBoard-2008)

- a) Biochemistry b) Biotechnology **c) Bioenergetics** d)

Biophysics

4) The break down of terminal phosphate of ATP releases energy about:
(Lahore Board-2009)

- a) 7.0 k cals **b) 7.3 k cals** c) 7.5 k cals d)

8.1 k cals

5) The accessory pigments found in chloroplasts are: (Lahore Board-2010)

- a) Chlorophyll a b) Chlorophyll c
c) Bacterial chlorophyll d) **Chlorophyll b and**

carotenoids

6) Chlorophyll a is found in all photosynthetic organisms except: (Lahore Board-2010)

- a) Diatoms b) Red algae c) **Bacteria** d)

Euglena

7) In Mitochondria, the pumping of proton (Chemiosmosis) is across the: (Lahore Board-2011)

- A) Outer membrane
C) Matrix
- B) Inner membrane**
D) Inter membraneous space

8) The head of chlorophyll molecule is a complex of: (Lahore Board-2011)

- A) Benzene ring B) Mg ring C) Pyrrol ring **D)**

Porphyrin ring

9) Light wavelength least absorbed by chlorophylls is: (Lahore Board-2012)

- A) Violet B) Blue **C) Yellow** D) Orange

10) The maximum absorption peaks of length are: (Lahore Board-2012)

650 A) 450.640 B) 440,490 C) **430,670** D) 550,

11) **Plastocyanin protein contains: (A-2013-Group I)**

A) Iron B) **Copper** C) Magnesium D) Potassium

12) **The breaking of terminal phosphate of ATP releases energy: (A-2013-Group I)**

A) 7.3 Cal B) 7.3 J C) **7.3 K Cal** D) 7.3/ Vatt

13) **The dark reaction occurs in: (A-2013-Group II)**

A) Cytoplasm B) Chloroplast C) **Stroma** D) Grana

14) **The number of chloroplast in each mesophyll cell is about: (A-2013-Group II)**

A) 10-100 B) 10-200 C) **20-100** D) 20-200

Gujranwala Board

1) **In yeast, the products of anaerobic respiration are: (Gujranawala Board-2004)**

a) Methyl alcohol b) **Ethyl alcohol** c) Lactic acid d)

Pyruvic acid

2) **Enzymes involved in cellular respiration are found in: (Gujranawala Board-2005)**

a) Cytoplasm b) Golgi bodies
c) **Mitochondria** d) Endoplasmic

Reticulum

3) **Magnesium, an important nutrient ion in plant, is essential component of: (Gujranawala**

Board-2007)

a) Cell sap b) Protein c) **Chlorophyll** d) Glucose

4) **Glycolysis is the breakdown of glucose up to the formation of:**

(Gujranawala Board-2007)

a) **Pyruvic acid** b) Sulphuric acid c) ATP d) NAD

5) **The chemical link between catabolism and anabolism is: (Gujranawala Board-2009)**

a) Growth b) **ATP** c) Respiration d)

Transpiration

6) **In the first step of the citric acid cycle, acetyl CoA reacts with oxaloacetate to form:**

(Gujranawala Board-2010)

a) Pyruvate b) **Citrate** c) NADH d) ATP

7) **The molecular formula of chlorophyll b is: (Gujranawala Board-2010)**

a) $C_{55}H_{72}O_5N_4Mg$ b) $C_{56}H_{70}O_5N_3Mg$
c) **$C_{55}H_{70}O_6N_4Mg$** d) $C_{50}H_{70}O_5N_3Mg$

8) **Magnesium of chlorophyll is replaced in hemoglobin by: (Gujranwala Board-2011)**

A) Calcium B) Potassium C) **Iron** D) Phosphorous

9) **Thylakoid membranes are involved in ATP synthesis by: (Gujranwala Board-2011)**

A) Chemosynthesis B) **Chemiosmosis**
B) Chemotherapy D) Chemotactic

10) **Porphyrin ring of chlorophyll is made up of four joined smaller: (Gujranwala Board-2012)**

A) Pyranore rings B) **Pyrrol rings** C) Furanore rings D)

Phyto rings

11) **Which wave length of light is least absorbed by chlorophyll? (A-2013)**

A) **Yellow** B) Violet C) Blue D) Orange

12) **First step in the Krebs cycle is the union of acetyl CoA oxaloacetate to form: (A-2013)**

A) Succinate B) Malate C) Pyruvate D) **Citrate**

Rawalpindi Board

- 1) **Haeme portion of haemoglobin contains: (Rawalpindi Board-2010)**
 a) Mg^{++} b) Fe^{++} c) Fe^{+++} d) Ca^{++}
- 2) **Glycolysis is the break down of: (Rawalpindi Board-2011)**
 A) Sucrose B) Lactose C) **Glucose** D) Maltose
- 3) **Yeast during fermentation produce CO_2 , ATP and: (Rawalpindi Board-2011)**
 A) Acetyl CoA B) Lactate C) Pyruvate D) **Ethyl alcohol**
- 4) **The only photosynthesizing cells of epidermis of leaf are: (Rawalpindi Board-2012)**
 A) Cortex cells B) Mesophyll cells C) **Guard cells** D) Xylem cells
- 5) **The carotene are mostly red to: (A-2013)**
 A) Blue B) Yellow C) **Orange** D) Green
- 6) **The first action spectrum was obtained by T.W Engelmann in: (A-2013)**
 A) 1983 A.D B) **1883 A.D** C) 1783 A.D D) 1683 A.D

Sargodha Board

- 1) **The mechanism of ATP synthesis during phosphorylation is: (Sargodha Brd-2010)**
 a) Osmosis b) **Chemiosmosis** c) Diffusion d) Active transport
- 2) **The amount of glucose converted into ATP during Anaerobic Respiration: (Sargodha Board-2011)**
 A) 4 % B) 3 % C) **2 %** D) 1 %
- 3) **The compound formed during muscle fatigue is: (Sargodha Board-2011)**
 A) Alcohol B) **Lactic acid** C) Hydrochloric acid D) Carbon
- 4) **Chlorophyll "a" is: (Sargodha Board-2012)**
 A) Yellow green B) **Blue green** C) Orange green D) Violet blue
- 5) **Which one of the following is not concerned with oxidative phosphorylation? (A-2013)**
 A) Coenzyme Q B) Cytochrome b C) Cytochrome a_3 D) **Plastocyanin**
- 6) **Photosystem II has the form of chlorophyll a which absorb best the light of: (A-2013)**
 A) 670 nm B) **680 nm** C) 690 nm D) 700 nm

Faislabad Board

- 1) **The water splitting up of photosynthesis that releases oxygen is called: (Faislabad Board-2007)**
 a) Electron Transport Chain b) **Photolysis**
 c) Chemiosmosis d) Dark reaction
- 2) **In the first step of the citric acid cycle, acetyl CoA reacts with oxaloacetate to form: (Faislabad Board-2008)**
 a) Pyruvate b) **Citrate** c) ATP d) NADH
- 3) **The breaking of terminal phosphate of ATP releases about 7.3 k.cals of: (Faislabad Board-2009)**
 a) O_2 b) NO_2 c) Heat d) **Energy**
- 4) **The quantitative study of energy relationships and energy conversion in the biological system is: (Faislad Board-2010)**
 a) **Bioenergetics** b) Biophysics c) Biochemistry d) Biotechnology

- 5) **Molecular formula for chlorophyll b is: (Faislabad Board-2011)**
 A) $C_{55}H_{72}O_5N_4Mg$ B) $C_{55}H_{70}O_6N_4Mg$
 C) $C_{55}H_{70}O_5N_4Mg$ D) $C_{55}H_{72}O_6N_4Mg$
- 6) **Calvin cycle is also known as: (Faislabad Board-2011)**
 A) **C₃ pathway** B) C₄ pathway C) C₅ pathway D) C₆ pathway
- 7) **Magnesium of chlorophyll is replaced in hemoglobin by: (Faislabad Board 2012)**
 A) Calcium B) Potassium C) **Iron** D) Phosphorous
- 8) **The NADPH molecule will provide reducing power for the sugar in the: (A-2013)**
 A) **Calvin cycle** B) Cyclic phosphorylation
 C) Electron transport chain D) Chemiosmosis
- 9) **The breaking of the terminal phosphate of ATP release energy of about: (A-2013)**
 A) 9.3 K Cal. B) 3.7 K Cal. C) **7.3 K Cal.** D) 5.3 K Cal.

Chapter No: 12 1 MCQ
Multan Board

- 1) **The structure in the mouth that prevents food from the nasal cavities is the:**
 (Multan Board-1st Annual 2007)
 a) Epiglottis b) Tongue c) **Soft palate** d) Pharynx
- 2) **Ammonia, a waste product of amino acid metabolism, is converted to urea in:**
 (Model Paper of Multan Board-2006-2008)
 a) Kidney b) **Liver** c) Villi d) Pancreas
- 3) **A plant requires Nitrogen and Sulphur for its: (Multan Board-1st Annual 2008)**
 a) Cell wall b) Enzyme c) Starch deposits d) **DNA replication**
- 4) **Which of the following is not an Omnivore? (Multan Board-2nd Annual 2008)**
 a) Crow b) Bear c) **Pig** d) None of these
- 5) **In Cockroach food is temporarily stored in: (Multan Board-1st Annual 2009)**
 a) Gizzard b) Oesophagus c) Mesenteron d) **Crop**
- 6) **The loss of appetite due to fear of becoming obese is: (Multan Board-2nd Annual 2009)**
 a) Bulimia nervosa b) **Anorexia nervosa** c) Dyspepsia d) Obesity
- 7) **Gall stones are produced in the gall bladder due to precipitation of: (Multan Board-1st Annual 2010)**
 a) Glucose b) **Cholesterol** c) Glycerol d) $CaCO_3$
- 8) **The uptake of the diffusible food molecules from the digestive region across the membrane into the cell is called: (Multan Board-(S) 2010)**
 A) Ingestion B) Digestion C) **Absorption** D) Assimilation
- 10) **In Hydra the indigestible and partly digested food is removed from endodermal cells into the digestive cavity by: (Multan Board-(S) 2010)**
 A) Endocytosis B) **Exocytosis** C) Osmosis D) Exosmosis
- 11) **Some bacteria breakdown the process of dead plants and animals and release: (Multan Board-(A) 2011)**
 A) Sulphates B) Phosphates C) **Nitrates** D) Carbonates

- 12) **Biological name of Sundew is: (Multan Board-(S) 2011)**
 A) *Dionaea muscipula* B) *Drosera intermedia*
 C) *Sarracenia pupurea* D) *Medicago sativa*
- 13) **A neurotic disorder in slightly older girls is: (Multan Board-(A) 2012)**
 A) Anorexia nervosa B) Bulimia nervosa C) Dispepsia D) Obesity
- 14) **Rodents are: (Model Paper of Multan Board Session 2012-2013 and onward)**
 A) Herbivores B) Detritivores C) Carnivores D) Omnivores
- 15) **Which one of the following is not a carnivore? (Multan Board-1st Annual 2013)**
 A) Cat B) Dog C) Bear D) Tiger

Bahawalpur Board

- 1) **Carbohydrate digesting enzyme is: (Bahawalpur Board-2007)**
 a) Ptyalin b) Gastrin c) Pepsin d) Lipase
- 2) **Which of these is not a filter feeder? (Bahawalpur Board-2008)**
 a) Mussel b) Whale c) Hydra d) None of these
- 3) **In man most of the digestion takes place in: (Bahawalpur Board-2009)**
 a) Stomach b) Small intestine c) Large intestine d) Mouth
- 4) **Parotid Glands are situated in front of the: (Bahawalpur Board-2010)**
 a) Jaws b) Ears c) Tongue d) Eye
- 5) **In Cockroach food is temporarily stored in: (Bahawalpur Board-2011)**
 A) Oesophagus B) Crop
 C) Gizzard D) Stomach
- 6) **Deficiency of phosphorous causes stunted growth of: (Bahawalpur Board-2012)**
 A) Shoot B) Root
 C) Leaf D) Flower
- 7) **Deficiency of which mineral in soil causes stunted growths of roots in plants: (Bahawalpur Board-2013)**
 A) Potassium B) Phosphorous C) Nitrogen D) Magnesium

Dera Ghazi Khan Board

- 1) **Owing to nutritional point of view earthworms are: (Dera Ghazi Khan Board-2008)**
 a) Carnivores b) Detritivores c) Filter feeders d) Herbivores
- 2) **Taking in of complex food is called: (Dera Ghazi Khan Board-2009)**
 a) Digestion b) Absorption c) Assimilation d) Ingestion
- 3) **The structure that prevents the food from entering the nasal cavities is: (Dera Ghazi Khan Board-2009)**
 a) Epiglottis b) Soft palate c) Tongue d) Pharynx
- 4) **One of the following plays a slight antiseptic role in the oral cavity: (Dera Ghazi Khan Board-2010)**
 a) Water b) Mucus c) Sodium bicarbonate d) Amylase
- 5) **Deficiency of phosphorous causes stunted growth of: (Dera Ghazi Khan Board-2011)**
 A) Shoot B) Root C) Leaf D) Flower
- 6) **HCl is secreted by gastric gland's cells of stomach: (Dera Ghazi Khan Board-2012)**

A) **Oxyntic cells** B) Chief cells C) Mucus cells D) Zymogen cells

Lahore Board

- 1) **Liver secretes bile into: (Lahore Board-2006)**
a) Ileum b) Stomach c) **Duodenum** d) Jejunum
- 2) **If the absorption of water and salt does not take place due to infection, drug action or emotional disturbance, a condition known as: (Lahore Board-2007)**
a) **Diarrhea** b) Vomiting c) Dyspepsis d) Anorexia
- 3) **HCl is secreted by gastric gland's cells of stomach: (Lahore Board-2007)**
a) Mucous cells b) Chief cells c) **Parietal cells** d) Zymogen cells
- 4) **The animals which feed on plants are: (Lahore Board-2008)**
a) Detritivores b) **Herbivores** c) Carnivores d) Omnivores
- 5) **Which is not related to gastric juice in humans? (Lahore Board-2009)**
a) Pepsin b) Mucus c) HCl d) **Amylase**
- 6) **These animals have large canine: (Lahore Board-2010)**
a) **Carnivores** b) Detritivores c) Herbivores d) Omnivores
- 7) **The one in which only intracellular digestion occurs: (Lahore Board-2011)**
A) Cockroach B) Planaria C) **Amoeba** D) Hydra
- 8) **Which one of the following is not a carnivore? (Lahore Board-2012)**
A) Cat B) Dog C) Lion D) **Deer**
- 9) **Dipeptides are broken down into amino acids by: (Lahore Board-2012)**
A) **Erypsin** B) Pepsin C) Trypsin D) Lipase
- 11) **In root nodules bacteria convert nitrogen into: (A-2013-Group I)**
A) Ammonia B) **Nitrate** C) Urea D) Nitrite
- 12) **The human stomach is situated below the: (A-2013-Group II)**
A) **Diaphragm** B) Liver C) Kidneys D) Spleen

Gujranwala Board

- 1) **Taking in of complex food is called: (Gujranawala Board-2007)**
a) Digestion b) Absorption c) Assimilation d) **Ingestion**
- 2) **The structure in the mouth that prevents the food from entering the nasal cavities is: (Gujranawala Board-2007)**
a) Epiglottis b) **Soft palate** c) Tongue d) Pharynx
- 3) **Oxyntic cells secrete: (Gujranawala Board-2009)**
a) Mucous b) Bicarbonates c) **HCl** d) Pepsinogen
- 4) **Which animal has no need for gall bladder? (Gujranawala Board-2010)**
a) Cat b) Man c) Lion d) **Goat**
- 5) **pH of fresh saliva is about: (Gujranwala Board-2011)**
A) 6.0 B) 7.0 C) **8.0** D) 9.0
- 6) **In *Hydra*, ectodermal cells get food from endodermal cells by: (Gujranwala Board-2011)**
A) Osmosis B) Active transport C) Facilitated Diffusion D) **Diffusion**
- 7) **Deer and sheep are examples of: (Gujranwala Board-2012)**
A) **Herbivores** B) Detritivores C) Carnivores D) Omnivores
- 8) **In plants stunted growth growth of roots is due to deficiency of: (A-2013)**
A) Potassium B) Phosphorous C) Magnesium D) **Nitrogen**

Rawalpindi Board

1) **Utilization of products of digestion for production of energy or synthesis of cellular**

material is: (Rawalpindi Board-2010)

- a) Absorption b) Digestion c) **Assimilation** d)

Egestion

2) **Many humans become ill from consuming milk and milk products because they lack:**

(Rawalpindi Board-2011)

- A) Pepsin B) Renin C) HCl **D) Lactase**

3) **Elimination of undigested matter by an animal is called: (Rawalpindi Board-2012)**

- a) Ingestion **B) Excretion** C) Absorption D)

Digestion

4) **In cockroach food is temporarily stored in: (A-2013)**

- A) Rectum B) Gizzard **C) Crop** D) Colon

Sargodha Board

1) **The animals which feed on organic debris are: (Sargodha Board-2010)**

- a) Herbivores b) Carnivores c) Omnivores **d)**

Detritivores

2) **Digestion in *Hydra* takes place in: (Sargodha Board-2011)**

- A) Mouth B) Colon **C) Enteron** D) Stomach

3) **Intestinal caecae are present in the digestive system of: (Sargodha Board-2011)**

- A) *Hydra* **B) Planaria** C) Cockroach D) Earthworm

4) **The middle part of the small intestine of man is called: (Sargodha Board-2012)**

- A) Jejunum** B) Duodenum C) Ileum D) Colon

5) **Enzyme which converts di peptides into amino acids is named as: (A-2013)**

- A) Erypsin** B) Amino peptidase C) Pepsin D) Trypsin

Faislabad Board

1) **Incomplete or imperfect digestion is called: (Faislabad Board-2007)**

- a) Food poisoning b) Obesity **c) Dyspepsis** d) Ulcer

2) **Digstion in *Hydra* and *Planaria* takes place within their: (Faislabad Board-2008)**

- a) Coelom **b) Gastrovascular cavity** c) Alimentary canal d)

Mouth

3) **Constipation is caused by excessive absorption of: (Faislabad Board-2009)**

- a) Water** b) Oxygen c) Blood d) Food

4) **Some bacteria break down the proteins of dead plants and animals and release:**

(Faislabad Board-2010)

- A) Potassium b) Phosphorous **c) Nitrates** d)

Oxygen

5) **Hepatic and pancreatic secretions are also stimulated by a hormone called:**

(Faislabad Board-2011)

- A) Gastrin B) Insulin
C) Pepsinogen **D) Secretin**

6) **pH of fresh saliva is: (Faislabad Board 2012)**

- A) 6 **B) 8** C) 9 D) 10

7) **Hepatic and pancreatic secretions are stimulated by a hormone called: (A-2013)**

- A) Gastrin **B) Secretin** C) Zymogen D) Parietal

Multan Board

Multan Board

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Bahawalpur Board

- 1) **Respiratory pigments present in muscle cell are: (Bahawalpur Board-2007)**
a) **Myoglobin** b) Globin c) Haemoglobin d) Haemocyanin
- 2) **Exhaled air contains CO₂: (Bahawalpur Board-2008)**
a) 0.04 % b) **4 %** c) .4 % d) 79 %
- 3) **Tuberculosis is the disorder of: (Bahawalpur Board-2009)**
a) Digestive System b) Circulatory System
c) Excretory System d) **Respiratory System**
- 4) **The main sites of exchange of gases in plants are: (Bahawalpur Board-2010)**
a) **Stomata** b) Hydathodes c) Cuticle d) Petals
- 5) **How many molecules of Oxygen can bind with a molecule of Myoglobin? (Bahawalpur Board-2011)**
A) **One** B) Two C) Three D) Four
- 6) **Respiratory pigment present in muscles is called: (Bahawalpur Board-2012)**
A) Haemoglobin B) Haemocyanin C) **Myoglobin** D) Globulin
- 7) **Thin walled tiny ducts called Parabronchi are found in lungs of: (Bahawalpur Board-2013)**
A) Amphibians B) **Birds** C) Reptiles D) Mammals

Dera Ghazi Khan Board

- 1) **The air is directly supplied through tracheoles to tissue cells: (Dera Ghazi Khan Board-2008)**
a) Birds b) **Cockroach** c) Earthworm d) Fish
- 2) **The floor of chest cavity in man is: (Dera Ghazi Khan Board-2010)**
a) **Diaphragm** b) Pericardium c) Pleura d) Ribs
- 3) **Respiratory pigment present in muscles is: (Dera Ghazi Khan Board-2011)**
A) Hemoglobin B) Haemocyanin C) **Myoglobin** D) Globulin
- 4) **Respiratory System is more efficient in: (Dera Ghazi Khan Board (A)-2012)**
A) Man B) Fish C) **Birds** D) Frog

Lahore Board

- 1) **The pathway in which RuBP is converted into serine is called: (Lahore Board-2007)**
a) Breathing b) Photophosphorylation
c) **Photorespiration** d) Electron transport chain
- 2) **The respiratory organs in Fish are: (Lahore Board-2008)**
a) Lungs b) Air sacs c) **Gills** d) Tracheae
- 3) **In Cockroach when abdomen expands then the spiracles that open are: (Lahore Board-2009)**
a) 4 b) 5 c) 6 d) **8**
- 4) **How much air is held by lungs when they are fully inflated in man? (Lahore Board-2008)**
a) **5 liters** b) 4.5 liters c) 4 liters d) 3.5 liters
- 5) **Total inside capacity of lungs of human beings, when fully inflated, is: (Lahore Board-2011)**

- liters
6) During photorespiration glycine after its formation diffuses into: (Lahore Board-2012)
 A) Ribosome **B) Mitochondria** C) Peroxisome D) Glyoxisome
- 7) Breathing rate in man at rest is:** (Lahore Board-2012)
 A) 01-15 times /min **B) 15-20 times /min**
 C) 20-25 times /min C) 25-30 times /min
- 8) In earth exchange of gases mainly occurs through:** (A-2013- Group I)
 A) Gills B) Lung **C) Skin** D) Ostia
- 9) The number of air sacs in birds are:** (A-2013- Group II)
 A) 6 B) 7 C) 8 **D) 9**

Gujranwala Board

- 1) The respiratory system is most efficient in:** (Gujranawala Board-2006)
 a) Man **b) Bird** c) Fish d) Snake
- 2) The complex cartilaginous structure at the upper end of the trachea is called:**
 (Gujranawala Board-2007)
 a) **Larynx** b) Alveoli c) Bronchiole d) Pharynx
- 3) Exchange of gases in earthworm mainly occurs through:** (Gujranawala Board-2009)
 a) **Skin** b) Vocal cords c) Lungs d) Gills
- 4) Blood contains oxygen per 100 ml of blood when haemoglobin is 98 % saturated:**
 (Gujranawala Board-2010)
 a) **19.6 ml** b) 18.6 ml c) 17.6 ml d) 16.6 ml
- 5) The most efficient and highly modified for gaseous exchange in aquatic animals are:**
 (Gujranwala Board-2011)
 A) **Gills** B) Lungs C) Spiracles D) Trachea
- 6) A process in which ribulose biphosphate carboxylase / oxygenase (Rubisco) fixes oxygen instead of carbon dioxide is called:** (Gujranwala Board-2012)
 A) Respiration **B) Photorespiration** C) Glycolysis D) Krebs's cycle
- 7) All of the following contain cartilage except:** (A-2013)
 A) Larynx B) Trachea **C) Bronchioles** D) Bronchi

Rawalpindi Board

- 1) Haem portion of haemoglobin contains:** (Rawalpindi Board-2010)
 a) Mg⁺⁺ **b) Fe⁺⁺** c) Fe⁺⁺⁺ d) Ca⁺⁺
- 2) Oxygen content of fresh air is about ml per liter as compared with water media:**
 (Rawalpindi Board-2010)
 a) 100 **b) 200** c) 400 d) 800
- 3) The total number of exterior paired apertures for respiration in Cockroach is:**
 (Rawalpindi Board-2011)
 A) **10** B) 12 C) 14 D) 20

4) **Lungs are covered with double membraneous sac called as: (Rawalpindi Board-2012)**

- A) **Pleura** B) Pericardium C) Scortum D) Diaphragm

5) **During photo respiration glycolate diffuses into the membrane bound organelle**

named as: (A-2013)

- A) Mitochondria B) Ribosome C) **Peroxisome** D) Golgi bodies

Sargodha Board

1) **Respiratory activity which occurs in plants during day time is called: (Sargodha Board-2010)**

- a) Photosynthesis b) **Photorespiration** c) Respiration d) Fermentation

2) **The total lungs capacity for air is: (Sargodha Board-2011)**

- A) Two litres B) Three litres C) Four litres D) **Five litres**

3) **About 70 % CO₂ is carried as: (Sargodha Board-2012)**

- A) CO₂ B) Carboxyhaemoglobin C) **Bicarbonate ion** D) Carbonte ion

4) **A litter of water contains ----- ml of oxygen: (A-2013)**

- A) **10** B) 20 C) 30 D) 40

Faislabad Board

1) **How much air can lungs hold when they are fully inflated? (Faislabad Board-2007)**

- a) **5 liters** b) 4 liters c) 4.5 liters d) 3.5 liters

2) **Respiratory pigment present in muscles is called: (Faislabad Board-2008)**

- a) Globin b) Haemoglobin c) Haemocyanin d) **Myoglobin**

3) **In most birds, the number of air sacs is: (Faislabad Board-2009)**

- a) Seven b) Eight c) **Nine** d) Ten

4) **Cellular respiration is directly involved in the production of: (Faislabad Board-2010)**

- a) Glucose b) Proteins c) **Energy** d) Aminoacids

5) **Air space between mesophyll cells of leaves comprise up to: (Faislabad Board-2011)**

- A) 20 % B) 30 % C) **40 %** D) 50 %

6) **The most efficient and highly modified for gaseous exchange in aquatic animals**

are: (Faislabad Board-2012)

- A) **Gills** B) Lungs C) Spiracles D) Trachea

7) **The normal alveolar ventilation is regulated by: (A-2013)**

- A) Hemoglobin B) Oxygen C) Iron D) **Carbon dioxide**

Chapter No: 14 2 MCQs

Multan Board

1) **Casparian strips are present in: (Multan Board-1st Annual 2007)**

- a) Cortex cells of roots b) **Endodermis cells of roots**
c) Pericycle d) Phloem

- 2) Which of the following processes cause substances to move across membranes without the expenditure of cellular energy? (Multan Board-1st Annual 2007)
 a) Endocytosis b) Active transport c) **Diffusion** d) None of these
- 3) The cells of phloem that conduct sugars and organic material throughout the plant are known as: (Multan Board-2nd Annual 2007)
 a) Xylem b) **Sieve cells** c) Stylets d) Guard cells
- 4) Narrowing and hardening of arteries is: (Multan Board-2nd Annual 2007)
 a) **Antherosclerosis** b) Collapsing c) Thickening d) None
- 5) Lymph mostly closely resembles with: (Multan Board-2nd Annual 2007)
 a) Blood b) Plasma c) **Interstitial fluid** d) Urine
- 6) The pathway involving system of adjacent cell walls which is continuous throughout the plant roots: (Model Paper of Multan Board-2006-2008)
 a) Casparian strip b) **Apoplast** c) Symplast d) Plasmodesmata
- 7) Haemoglobin molecule in most cases does not have B chain in it, instead F chain is present: (Model Paper of Multan Board-2006-2008)
 a) Oedema b) Leukemia c) Thrombosis d) **Thalassaemia**
- 8) Lymph mostly closely resembles with: (Multan Board-1st Annual 2008)
 a) Blood b) Plasma c) **Interstitial fluid** d) Urine
- 9) Hydathodes are associated with: (Multan Board-1st Annual 2008)
 a) Transpiration b) **Guttation** c) Conduction d) None of these
- 10) The most abundant compound in blood plasma is: (Multan Board-2nd Annual 2008)
 a) NaCl b) Albumin c) **Water** d) Globulin
- 11) The weight of the blood in our body is about of our body: (Multan Board-1st Annual 2009)
 a) $1/6^{\text{th}}$ b) $1/5^{\text{th}}$ c) **$1/12^{\text{th}}$** d) $1/20^{\text{th}}$
- 12) The normal pH of blood is: (Multan Board-2nd Annual 2009)
 a) 6.0 b) **7.4** c) 8.0 d) 9.0
- 13) The volume of dry seeds may increase upto 200 times after absorbing water by: (Multan Board-1st Annual 2010)
 a) Diffusion b) **Imbibition** c) Osmosis d) Active transport
- 14) One complete heart beat consists of one systole and one diastole lasts for about: (Multan Board-1st Annual 2010)
 a) 0.3 Sec b) 0.5 Sec c) **0.8 Sec** d) 1.0 Sec
- 15) Thalassaemia is also called anemia: (Multan Board-1st Annual 2010)
 a) **Cooley's** b) Thomas c) Kock's d) Meischer's
- 16) A rye plant less than one meter tall has some 14 million branch roots of a combined length of over: (Multan Board-(S) 2010)
 A) 400 km B) 500 km C) **600 km** D) 700 km
- 16) In Aphids the honey dew contains 10-25 % dry matter, 90 % or more of which is sucrose. Nitrogen compounds are: (Multan Board-(S) 2010)

- 15 %
- 17) A rye plant less than one meter tall has branch roots: (Multan Board-(A) 2011)
- A) 14 million B) 15 million C) 16 million D) 17 million
- 18) The mutual holding of water molecules to form solid chain-like column in xylem is due to bonds: (Multan Board-(A) 2011)
- A) Ionic B) Hydrogen C) Covalent D) Ester
- 19) A hormone is released by mesophyll cells at high temperature: (Multan Board-(A) 2011)
- A) Amin acids B) Abscissic Acid
C) Hydrochloric Acid D) Sulphuric Acid
- 20) Hydathodes are associated with: (Multan Board-(S) 2011)
- A) Transpiration B) Evaporation C) Guttation D) Translocation
- 21) The lymph vessels open into: (Multan Board-(S) 2011)
- A) Arteries B) Arterioles C) Capillaries D) Veins
- 22) The opening and closing of stomata is caused by: (Multan Board-(S) 2011)
- A) Ca^{++} B) Mg^{++} C) K^{+} D) Na^{+}
- 23) The uncontrolled production of white blood cells results in: (Multan Board-(A) 2012)
- A) Leucaemia B) Thalassemia C) Oedema D) Asthma
- 24) Renal vein brings the impure blood from: (Multan Board-(A) 2012)
- A) Brain B) Kidney C) Lungs D) Liver
- 25) Ions involved in the opening and closing of Stomata is: (Multan Board-(A) 2012)
- A) Sodium B) Calcium C) Potassium D) Magnesium
- 26) Attraction between water-water molecules in xylem tissue is called: (Multan Board-(A) 2012)
- A) Tention B) Adhesion C) Cohesion D) Imbibition
- 27) Type of blood cells which stay from 10-20 hours in blood and then enter in tissues and become macrophages are called: (Multan Board-(A) 2013)
- A) Monocytes B) Lymphocytes C) Basophils D) Neutrophils
- 28) Single circuit heart is found in: (Multan Board-(A) 2013)
- A) Birds B) Fishes C) Reptiles D) Mammals

Bahawalpur Board

- 1) The shrinkage of protoplast due to exosmosis of water is: (Bahawalpur Board-2007)
- a) Plasmolysis b) Deplasmolysis
c) Incipient plasmolysis d) Osmosis
- 2) Double circuit heart is present: (Bahawalpur Board-2008)
- a) Reptiles b) Birds c) Mammals d) All of these
- 3) The blood pressure is highest in: (Bahawalpur Board-2009)
- a) Vein b) Aorta c) Capillaries d) Arteries
- 4) In arthropods the circulatory system is: (Bahawalpur Board-2009)

- a) Closed **b) Open** c) Absent d) None of these
- 5) A hormone released by Mesophyll Cells at high temperature is:**
(Bahawalpur Board-2010)
a) **Abscisic Acid** b) Amino Acid c) HCl d) H_2SO_4
- 6) The mutual holding of water molecules to form solid chain-like column in Xylem is due to:** (Bahawalpur Board-2010)
a) Ionic Bonds b) Covalent Bonds **c) Hydrogen Bonds** d) Ester Bonds
- 7) The velocity of sugar movements in phloem in one hour is:** (Bahawalpur Board-2010)
a) **1 meter** b) 2 meters c) 3 meters d) 4 meters
- 9) Hydathodes are associated with:** (Bahawalpur Board-2011)
A) Transpiration B) Evaporation
C) Guttation D) Transport of Food
- 10) Plasma cells are produced from:** (Bahawalpur Board-2011)
A) Eosinophyll B) Basophills
C) Monocytes **D)**
- Lymphocytes**
- 11) Casparian strips are present in:** (Bahawalpur Board-2012)
A) Cortex **B) Endoderm** C) Pericycle D) Epidermis
- 12) A serum containing antibodies is called:** (Bahawalpur Board-2012)
A) Antigen B) Antibodies C) Lymph **D)**
- Antiserum**
- 14) The heart which animals never receive Oxygenated Blood:** (Bahawalpur Board-2013)
A) Amphibians **B) Fishes** C) Birds D) Reptiles
- 15) The point at which plasmolysis is just about to happen is called:**
(Bahawalpur Board-2013)
A) Deplasmolysis B) Osmotic Potential
C) Pressure Potential **D) Incipient**
- Plasmolysis**

Dera Ghazi Khan Board

- 1) In man, blood from alimentary canal to liver is supplied by:** (Dera Ghazi Khan Board-2008)
a) **Hepatic portal vein** b) Hepatic vein c) Pulmonary vein d) Renal vein
- 2) Histologically, the arrangement of tissue layer from outside to inside-- Connective tissue, Circular smooth muscles, Elastic layer and Endothelium is in:**
(Dera Ghazi Khan Board-2008)
a) **Artery** b) Capillary c) Lymph vessel d) Vein
- 3) Average life span of Red Blood Cell is:** (Dera Ghazi Khan Board-2009)
a) 2 months b) 3 months c) 6 months **d) 4 months**
- 4) The most abundant compounds in Blood Plasma is:** (Dera Ghazi Khan Board-2009)
a) NaCl b) Albumin **c) Water** d) Globulin
- 5) The lymph vessels empty in:** (Dera Ghazi Khan Board-2010)
a) Arteries b) Arterioles c) Capillaries **d) Veins**
- 6) A serum containing antibodies is called:** (Dera Ghazi Khan Board-2010)

a) Antigen **b) Antiserum** c) Antibody Antigen complex d) Lymph

7) The movement of opening and closing of stomata is caused by: (Dera Ghazi Khan Board-2008)

a) Ca^{++} b) Mg^{++} **c) K^{+}** d) Na^{+}

8) Casparian strips are present in: (Dera Ghazi Khan Board-2011)

A) Cortex **B) Endodermis** C) Pericycle D) Epidermis

9) A serum containing antibodies is called: (Dera Ghazi Khan Board-2011)

A) Antigen B) Antibiotics C) Lymph **D) Antiserum**

10) The white blood cells which have life span of months or even years are: (Dera Ghazi Khan Board-2011)

A) Lymphocytes B) Monocytes C) Basophils D) Eosinophils

Lahore Board

1) The movement of ions cause opening and closing of stomata by: (Lahore Board-2006)

a) Ca^{++} b) Mg^{++} **c) K^{+}** d) All of these

2) Which of the following artery supplies blood to heart muscles? (Lahore Board-2008)

a) Pulmonary **b) Coronary** c) Systemic d) None of these

3) The shrinkage of protoplast due to exosmosis is: (Lahore Board-2008)

a) Ascent of sap b) Guttation **c) Plasmolysis** d) Deplasmolysis

4) Arteries that supply blood to heart wall are called: (Lahore Board-2009)

a) Femoral **b) Coronary** c) Cardiac d) Renal

5) The roots of Prosopis tree may penetrate deep in the soil upto: (Lahore Board-2008)

a) 5 m b) 25 m **c) 50 m** d) 70 m

6) Shrinkage of protoplasm by exosmosis of water is called: (Lahore Board-2010)

a) Bleeding b) Imbibition **c) Plasmolysis** d) Turgidity

7) Which is not a lymphoid mass? (Lahore Board-2010)

a) Spleen b) Tonsils c) Thymus **d) Liver**

8) The substance that inhibits blood clotting is: (Lahore Board-2011)

A) Histamine B) Sterol C) Antibody **D) Heparin**

9) Plant structures involved in guttation are: (Lahore Board-2011)

A) Lenticels **B) Hydathodes** C) Stomata D) Cuticles

10) One cardiac cycle is completed in: (Lahore Board-2011)

A) 0.3 seconds B) 0.5 seconds **C) 0.8 seconds** D) 1.2 seconds

11) Which one of the following animal has closed blood circulatory system? (Lahore Board-2012)

A) Snail **B) Octopus** C) Insect D) Spider

12) Disorder in which haemoglobin molecules have F chain instead of B chain is known as:

(Lahore Board-2012)
A) Thalassaemia B) Leucaemia C) Oedema D) Emphysema

13) Cerebral infarction is also known as: (Lahore Board-2012)

- A) **Stroke** B) Heart attack C) Hemorrhage D) Hypertension
- 14) **Histamine is produced by: (Lahore Board-2012)**
 A) Neutrophils B) Eosinophils C) **Basophils** D) Monocytes
- 15) **The plasma proteins contribute percent by weight of plasma: (A-2013-Group I)**
 A) **7—9** B) 9—11 C) 11—13 D) 13—15
- 16) **A substance produced by basophils that inhibits blood clotting is: (A-2013-Group I)**
 A) Fibrinogen B) **Heparin** C) Histamine D) Globulin
- 17) **Guttation occurs in plants through: (A-2013-Group II)**
 A) Cuticle B) **Hydathodes** C) Lenticels D) Stomata
- 18) **The volume of dry seeds may increase up to 200 times by: (A-2013-Group II)**
 A) Diffusion B) Osmosis C) **Imbibition** D) Active transport

Gujranwala Board

- 1) **Lymph closely resembles with: (Gujranawala Board-2006)**
 a) Blood b) Plasma c) **Interstitial fluid** d) Urine
- 2) **Hydathodes are associated with: (Gujranawala Board-2007)**
 a) Transpiration b) **Guttation** c) Conduction d) None of these
- 3) **In Cockroach, blood flows in all these except: (Gujranawala Board-2009)**
 a) Perivisceral sinus b) Haemocoel c) **Capillaries** d) Perineural sinus
- 4) **Hydathodes are associated with: (Gujranawala Board-2010)**
 a) Bleeding b) Transpiration c) **Guttation** d) Imbibition
- 5) **The open circulatory system is found in the phylum: (Gujranawala Board-2010)**
 a) **Mollusca and Arthropoda** b) Annelida
 c) Cnidaria and Nematoda d) Chordata
- 6) **Passive immunity is developed by injecting: (Gujranwala Board-2011)**
 A) Vaccine B) Serum C) **Antiserum** D) Antibiotic
- 7) **In Cockroach, a pair of lateral openings of each heart chamber is called: (Gujranwala Board-2011)**
 A) **Ostia** B) Osculum C) Nephridiopore D) Medreporite
- 8) **62 % of white blood cells are: (Gujranwala Board-2012)**
 A) **Neutrophils** B) Eosinophils C) Basophils D) Lymphocytes
- 9) **Coronary arteries supply blood to the: (Gujranwala Board-2012)**
 A) Head B) Shoulders C) **Heart** D) Kidneys
- 10) **Open blood circulatory system is found in: (A-2013)**
 A) Tunicates B) Mollusca C) **Arthropods** D) Annelids
- 11) **Which is not included in agranulocytes? (A-2013)**
 A) Basophils B) Eosinophils C) **Lymphocytes** D) Neutrophils

Rawalpindi Board

- 1) The active transport of ions is guarded which opens the stomata are:
(Rawalpindi Board-2010)
a) Na^+ b) K^+ c) Mg^{++} d) Ca^+
- 2) The agranulocyte white blood cell is: (Rawalpindi Board-2010)
a) Neutrophil b) Eosinophil c) **Monocyte** d) Basophil
- 3) Blood platelets are fragments of large cells called: (Rawalpindi Board-2011)
A) Microkaryocytes B) Erythrocytes
C) Leucocytes D) **Megakaryocytes**
- 4) In Earthworm, lateral hearts lie on the lateral side of oesophagus from:
(Rawalpindi Board-2011)
A) **7th to 13th segments** B) 8th to 20th segments
C) 7th to 10th segments D) 8th to 13th segments
- 5) The only photosynthesing cells of epidermis of leaf are: (Rawalpindi Board-2012)
A) Cortex cells B) Mesophyll C) **Guard cells** D) Xylem cells
- 6) The valves present in the veins are: (Rawalpindi Board-2012)
A) Bicuspid B) Tricuspid C) **Semilunar** D) Aortic
- 7) The valves present in the veins are called: (A-2013)
A) Bicuspid B) Tricuspid C) **Semilunar** D) Aortic
- 8) One complete heart beat consists of one systole which lasts for about: (A-2013)
A) 0.2 seconds B) **0.8 seconds** C) 0.5 seconds D) 1.0 second

Sargodha Board

- 1) The shrinkage of protoplast due to exosmosis of water is: (Sargodha Board-2010)
a) Deplasmolysis b) Imbibition c) **Plasmolysis** d) Transpiration
- 2) The number of heart chambers with respect to auricles and ventricles in amphibians is:
(Sargodha Board-2010)
a) 5 b) 4 c) **3** d) 2
- 3) The concentration of plasma in the blood is: (Sargodha Board-2011)
A) 45 % B) 50 % C) **55 %** D) 60 %
- 4) The exchange of food material takes place through: (Sargodha Board-2011)
A) **Capillary** B) Vein C) Artery D) Heart
- 5) The pairs of lateral hearts in Earthworm are: (Sargodha Board-2012)
A) **4 or 5** B) 5 or 6 C) 6 or 7 D) 7 or 8
- 6) 90 % of total transpiration is: (Sargodha Board-2012)
A) Cuticular B) C) Lenticular D) **Stomatal**
- 7) Which one of the following is present in the interstitial fluid? (A-2013)
A) Red blood cells B) **White blood cells**
C) Platelets D) Large protein molecules
- 8) Discharge of blood from blood vessel is called as: (A-2013)
A) Stroke B) Heart attack C) Thrombosis D) **Haemorrhage**

Faislabad Board

- 1) The movement of water molecules from a region of their higher concentration to a region of their low concentration through a semipermeable is called:** (Faislabad Board-2007)
 a) **Osmosis** b) Diffusion c) Root pressure d) Guttation
- 2) The heart of fish work as:** (Faislabad Board-2007)
 a) Double circuit heart **b) Single circuit heart**
 c) Closed circuit heart d) None of these
- 3) Hydathodes are associated with:** (Faislabad Board-2008)
 a) Transpiration b) Conduction **c) Guttation** d) None of these
- 4) The loss of water vapours through lenticels present in the stem is a:** (Faislabad Board-2008)
 a) **Lenticular transpiration** b) Cutaneous transpiration
 c) Stomatal transpiration d) None of these
- 5) The heart of birds is:** (Faislabad Board-2009)
 a) Two chambered b) Three chambered
c) Four chambered d) Five chambered
- 6) Antibodies are specific i.e cause the destruction of antigen, are manufactured in:** (Faislabad Board-2009)
 a) Monocyte b) Basophils **c) B-lymphocytes** d) Granulocytes
- 7) A rye plant less than one meter tall has branch roots about:** (Faislabad Board-2010)
 a) 12 million **b) 14 million** c) 16 million d) 18 million
- 8) Prosopis trees of leguminosae family have maximum depth of their roots:** (Faislabad Board-2010)
 a) **50 meter** b) 60 meter c) 70 meter d) 8 meter
- 9) Active transport is selective and dependent on:** (Faislabad Board-2010)
 a) Photosynthesis **b) Respiration** c) Excretion d) Transpiration
- 10) Casparian strips are present in:** (Faislabad Board-2011)
 A) Epidermis B) Pericycle **C) Endodermis** D) Cortex
- 11) The force of attraction among water molecules is:** (Faislabad Board-2011)
 A) Adhesion **B) Cohesion** C) Tensile B) Imbibition
- 12) The valves present in the veins are:** (Faislabad Board-2011)
A) Semilunar B) Tricuspid C) Bicuspid D) Aortic
- 13) Passive immunity is developed by injecting:** (Faislabad Board 2012)
 A) Vaccine B) Serum **C) Antiserum** D) Antibiotics
- 14) In Cockroach, a pair of lateral openings of the heart chamber is called:** (Faislabad Board 2012)
A) Ostia B) Osculum C) Nephridiopore D) Medreporite
- 15) A substance that inhibits blood clotting is: (A-2013)**
A) Heparin B) Fibrinogen C) Fibrin D) Thrombin

16) Closely associated with root pressure is phenomenon called: (A-2013)

- A) Hydathodes B) Imbibition C) Guttation D)

Plasmolysis

Additional MCQs from Text

Chapter No: 1

1. First living organisms evolved:

- a) 1000 M years ago b) 2000 M years

ago

- c) **3000 M years ago** d) 4000 M

years ago

2. Following is present in all cells whether prokaryotic or eukaryotic:

- a) Membranous organelles b) Cell wall

- c) **Cell membrane** d) Nucleus

3. In animals coordination is achieved by means of:

- a) Nervous System b) Endocrine

System

- c) Circulatory System d) **Both "a" and**

"b"

4. The life of--of Pakistan is towards decline:

- a) Forests b) Cities c) Marine water d) **Fresh**

water

5. We are living in:

- a) Cenozoic era

- b) Quaternary period

- c) Proterozoic era

- d) **Both "a" and "b" are**

correct

6. Following organisms are used for bioremediation:

- a) Some algae

- b) Some Fungi

- c) Some bacteria

- d) **All these**

7. Clones of following organisms have been obtained by separation of cells of embryo:

- a) Sheep

- b) Mice

- c) Cow

- d) **Cattle and other farm**

animals

8. Following is a national problem in Pakistan:

- a) Sewage

- b) Industrial wastes

- c) Endangered species

- d) **Environmental**

pollution

9. Vaccination was first developed for:

- a) Measles

- b) Cow pox

- c) Small pox

- d) **Both "b" and "c"**

and "c"

10. Evolving the populations of organisms living in the remote past is:

- a) Genetics

- b) Evolutionary

history

- c) **Phyletic lineage**

- d) Biodiversity

11. Tanneries release following pollutant/s in the atmosphere:

- a) **Chromium**

- b) Lead

- c) Ammonia

- d)

Both a and b

12. is not related to Human Biology:

- a) Ecological studies of human beings

- b) **Social behaviour of human beings**

- c) Evolution of human beings

- d) Genetics of human being

Chapter No: 2

1. In grapes, figs, dates and other fruits, is found:

- a) Protein

- b) **Glucose**

- c) Glycogen

- d)

Starch

2. Grains, seeds and tubers are found in:

- a) Sucrose b) Glucose c) Glycogen **d) Starch**
- 3. The length of t RNA is about -nucleotides:**
a) 200 b) 30-40 c) 1000 **d) 75-**
- 90**
- 4. The source of is green plant:**
a) Carbohydrates b) Protein c) Lipids d)
- Nucleic acids
- 5. The amount of protein in mammalian cells is:**
a) 75 % b) 70 % **c) 18%** d) 65 %
- 6. Lecithin is an example of:**
a) Polysaccharide **b) Phospholipid** c) Wax d)
- Nucleic acid
- 7. --have great affinity for basic proteins:**
a) Lipids b) Carbohydrates **c) Nucleic acids** d)
- Both a and b
- 8. The specific heat capacity of water is:**
a) 1 b) 2 c) 3 d) 4
- 9. involves the break down of large molecules into smaller molecules utilizing water molecules:**
a) Condensation **b) Hydrolysis** c) Anabolism d)
- Catabolism
- 10. Following is not an aldo-sugar:**
a) Fructose b) Glucose c) Ribose d)
- Galactose
- 11. Out of 574 amino acids in the hemoglobin of Sickle Cell only following amino acid/s does/ do not occupy normal place in the patient:**
a) Two b) One c) One in each chain d) One in each
- alpha chain
- 12. are rare in nature and occur in bacteria:**
a) Carbohydrates b) Pentose **c) Tetroses** d)
- Trioses
- 13. Most of the cellular secretions are-in nature:**
a) Proteins b) Lipids c) Carbohydrates **d)**
- Glycoproteins**
- 14. Which of the following includes all others in the list?**
a) Monosaccharide b) Disaccharide **d) Carbohydrate**
d) Starch

Chapter No: 3

- 1. Mg²⁺, Fe²⁺, Cu²⁺, Zn²⁺ etc. act as:**
a) Inhibitors b) Coenzymes **c) Activators** d)
- Prosthetic groups
- 2. is an enzyme:**
a) Fumaric acid b) Succinic acid
c) Malonic acid **d) Succinic**
- dehydrogenase**
- 3. Denaturation of enzyme occurs due to:**
a) High temperature b) Extreme changes in
pH
d) Low temperature **d) Both "a" and "b"**
- 4. Some vitamins act as:**
a) Enzymes **b) Co-enzymes** c) Activators d)
- Substrates
- 5. Enzymes are found:**
a) Dissolved in the cytoplasm.
b) Tightly bound to certain sub-cellular organelles.
c) Are attached to membrane systems inside the cell

- # Photosynthesis

1. Which organelle releases carbon dioxide?

- ## Glyoxisome

7. **Following does not act as a barrier to the materials passing through it:**
 a) Cell membrane b) Semi permeable membrane
 c) Selectively permeable membrane d) **Cell wall**
8. **Which organelle releases oxygen?**
 a) Ribosomes b) Golgi complex c) Mitochondria d) **Chloroplast**
9. **is the organelle which converts proteins into glycoproteins:**
 a) Ribosomes b) Lysosomes c) **Golgi complex** d) Glyoxisomes
10. **On average, there are or more thylakoids piled to form one granum:**
 a) 10 b) 20 c) 30 d) **50**
11. **Following organelle/s is/are self-replicating organelle/s:**
 a) Chloroplasts b) Mitochondria c) Gogi complex d) **Both "a" and "b"**
12. **Pea seeds do not contain:**
 a) Peroxisomes b) Lysosomes c) **Glyoxisomes** d) Ribosomes
13. **Fixation of CO₂ occurs in the following organelles:**
 a) **Chloroplasts** b) Mitochondria c) Golgi Complex d) Lysosomes

Chapter No: 5

1. **The virus of AIDS was named as HIV in:**
 a) 1984 b) **1986** c) 1915 d) 1988
2. **T₄ bacteriophage has tail fibers attached the end plate:**
 a) Two b) Four c) **Six** d) Eight
3. **Following viral disease is an ancient disease:**
 a) Polio b) **Small pox** c) Influenza d) Measles
4. **Rabies is a disease which is transferred to human by bites of rabid:**
 a) Dogs b) Foxes c) Cats d) Bats e) **All these**
3. **Following is complete, mature and infectious particle:**
 a) RNA b) Virus c) **Virion** d) DNA
4. **Lytic cycle of a bacteriophage lasts for minutes:**
 a) 20 b) **25** c) 30 d) 35
5. **Following disease is highly contagious, wide spread, but seldom fatal:**
 a) Measles b) Polio c) Herpes simplex d) **Mumps**
6. **What is true for hepatitis C virus (HCV)?**
 a) Less severe than A or B b) RNA enveloped
 c) Infusion virus d) **All these**
7. **Vaccine is not available for:**
 a) HAV b) HBV c) **HCV** d) HEV
8. **What is true for retroviruses?**
 a) They are also called oncoviruses
 b) They can convert normal cells into cancer cells
 c) A few retroviruses are non-specific
 d) **All these**
9. **Following is true for polio viruses:**
 a) Smallest known viruses b) Poliomyelitis
 c) Spherical capsid d) **All these**
10. **Bacteriophages were independently discovered by:**
 a) Twort in 1905 b) D' Herelle in 1917

- c) E. Chutton in 1937 d) Both "a" and "b"
- 11. In 1884 found that agent responsible for rabies can pass through procelain filter:**
- a) Louis Pasture b) D' Herelle c) E. Chotton d) Chamberland
- 12. Feces is the main source of transmission of:**
- a) HAV b) HBV c) HEV d) Both "a" and "c"

Chapter No: 6

- a) Purple sulfur b) Nitrogen fixing **c) Nitrifying** d) Green Sulfur

- a) Blue b) Pink c) **Purple** d) Red

- a) **Spirochete** b) **Vibrio** c) **Coccus** d) **Spirillum**

- a) Atrichous bacteria b) Cocci **c) Cyanobacteria** d) Both
"a" and "b"

- a) Bacteria from fresh culture **b) Bacteria from old culture**
- c) Non-susceptible d) Both "a" and "b"

- cultures of bacteria and immunization with attenuated cultures of bacteria respectively;**

7. **True pili are present only on:**

- negative bacteria**

- Microbes
- a) Microscopic organisms b)
- c) Animals **d)**

- 9. Autotrophic bacteria utilize as hydrogen source:**

- c) Hydrogen sulphide d) Water

- a) Plasma membrane b) Ribosome
c) Mesosomes **d) Both "a" and "c"**

- genes on them:**

- 12. The important chemical agents used for disinfection are:**

by means of:

- ## Membrane filters

a) Ammonia

c) Alcohol, Lactic Acid and Acetic Acid

“a” and “b”

1. Infective stage of *Plasmodium* for Mosquitoes is:

- ## Gametocytes

a) Sporozoites b) Merozoites c) Gametes d)

3. help the termites in digestion of dry wood:

- ## Amebas

a) Malaria b) Sporozoa **c) Malarial Parasite** d)

5. Following are brown algae:

- “a” and “b”**

a) Oocysts b) Sporozoites c) **Merozoites**

7. **Sleeping Sickness is spread by:**

- d) Wasp

a) Sessile Solitary Ciliate

b) Sessile

c) Flagellate

c) Motile

9. The multicellular body form of following is composed of complex interwoven

filaments that are delicate and feathery:

- a) Red Algae** b) Brown Algae c) Diatoms d)

10. form red tides:

- a) Red algae b) Diatoms c) Brown algae **d)**

Dinoflagellates

11. are major producers in marine and freshwater ecosystems:

- a) Plants b) Diatoms c) Dinoflagellates **d) Both "b"**

and “c”

12. is Animal-like protocist:

- a) Chlorella **b) Amoeba** c) Slime mold d)

13. Trichonymphas are:

- a) Parasites **b) Symbionts** c) Saprobies d)

Commensals

14. move by means of pseudopodia:

a) *Forams* b) *Rodolarians* c) *Amoeba proteus* d) **All these**

Chapter No: 8

1. Fungi are:

a) Absorptive heterotrophs b) Saprobies c) Decomposers d) **All these**

2. *Bacidia*, *Lecanor* are examples of:

a) Fruticose lichen b) **Crustose lichen** c) Foliose lichen d) Moss

3. Species of *Arthrobotrys* are:

a) Saprobies b) Parasites c) **Predators** d) Mutualists

4. Migraine is treated by a medicine made from:

a) Bacteria b) Medicinal plants c) **Fungi** d) Algae

5. Following is the pathogenic fungus afflicting conifers:

a) *Arthrobotrys* b) *Penicillium* c) ***Armillaria*** d) *Pleurotus ostreatus*

6. Zygosporangia are formed in the members of class:

a) **Zygomycota** b) Basidiomycota c) Ascomycota d) Deuteromycota

7. Symptoms of following are nervous spasm, convulsion, psychotic delusion and gangrene:

a) **Ergotism** b) Histoplasmosis c) Aspergillosis d) Candidiasis

8. Following can grow on oranges and jelly kept in a refrigerator:

a) *Aspergillus* b) *Morchella* c) *Candida* d) ***Penicillium***

9. *Trichoderma reesei* obtained from soil fungus is used in organ transplantation for preventing transplant rejection:

a) Griseofulvin b) Lovastatin c) **Cyclosporin** d) *Penicillium*

10. *Tuber* are underground fruiting bodies that people find with the help of trained dogs or pigs:

a) ***Tuber* species** b) *Morchella* spp c) *Agaricus* species d) *Aspergillus* spp

11. *Uromyces* produce orange-yellow colored disease spots on their hosts:

a) Rusts b) **Smuts** c) *Penicillium* d) Pink bread molds

12. *Rhodotorula* is commonly known as:

a) Brown mold b) Pink mold c) **Pink yeast** d) Black bread mold

13. Mushrooms belong to:

a) Zygomycota b) Ascomycota c) **Basidiomycota** d) Deuteromycota

14. Asexual Reproduction is uncommon in following group of fungus:

a) Zygomycota b) Ascomycota c) **Basidiomycota** d) Deuteromycota

15. The common name for *Aspergillus* is:

a) Black Bread Mold b) Blue Green Mold c) Pink Yeast d) **Brown Mold**

Chapter No: 9

1. **FronD is the characteristic of following group:**
a) **Ferns** b) Pteridiophytes c) Gymnosperms d) Angiosperms
2. **Pulses are rich in contents:**
a) **Protein** b) Carbohydrates c) Lipids d) Starch
3. **-is the first heterosporous plant:**
a) *Lycopodium* b) ***Selaginella*** c) *Adiantum* d) *Rhynia*
4. **Inflorescence is variable, solitary or may be racemose or cymose clusters. This is true for the members of following family:**
a) **Rosaceae** b) Solanaceae c) Papilionaceae d) Fabaceae
5. **can not live away from water. They need water for reproduction:**
a) *Adiantum* b) *Selaginella* c) ***Marchentia*** d) *Psilotum*
6. **Members of following family/families have zygomorphic flowers:**
a) Pea b) Cassia c) Grass d) **All these**
7. **In 1985 Nasir reported following genera and species of family Solanaceae in Pakistan:**
a) 14 and 150 b) 29 and 213 c) **14 and 52** d) 82 and 587
8. **Familiar plant Touch-Me-Not belongs to following family:**
a) Grass b) **Acacia** c) Cassia d) Potato
9. **Periamth is the characteristic of family:**
a) **Grass** b) Cassia c) Acacia d) Mimosa
10. **Following is leafy liverwort:**
a) *Marchentia* b) ***Porella*** c) *Funaria* d) *Anthoceros*
11. **were the first plants that formed the true leaves and roots:**
a) *Psilotum* b) ***Lycopodium*** c) *Tmesipeteris* d) *Equistem*
12. **The process of evolution of leaf was completed in more than - million years:**
a) **15-20** b) 2-4 c) 5-10 d) 10-20
13. **The thylloid gametophytes of following grow upon clayey soil and on mud:**
a) Pteropsida b) Lycopsida c) **Sphaenopsida** d) Psilopsida
14. **In the following archegonia and antheridia develop on the tips of different branches on the same plant:**
a) **Funaria** b) Polytrichum c) Marchentia d) Porella
15. **Following after fertilization is changed into a fruit:**
a) Ovule b) Seed c) **Ovary** d) Flower

Chapter No: 10

1. **The arthropods of class ---- are aquatic and have gills for respiration:**

- a) Insecta b) Arachnida c) **Crustacea** d) Myriopoda
2. ----- is the parasite which causes itching of anus in children:
a) Hookworm b) **Pinworm** c) Taenia d) Leech
3. -----move in large numbers from country to country and cause damage to standing crops and other plants:
a) Birds living in colder regions b) Insects
c) **Locust** d) Arthropods
5. The Coelom of is formed due to Splitting of Mesoderm:
a) Mosquito b) Earthworm c) Loligo d) **All these**
6. Following parasites have no intestine at all:
a) **Tapeworms** b) Flukes c) Nematodes d) Ectoparasites
7. -----is a fresh water bath sponge:
a) *Sycon* b) *Leucosolenia* c) ***Spongilla*** d) *Euplectella*
8. Hook worms belong to phylum:
a) Platyhelminthes b) **Nematoda** c) Arthropoda d) Mollusca
9. Some members of phylum act as vectors i.e. agencies which transfer pathogens from one organism to another:
a) Coelenterata b) Platyhelminthes c) Annelida d) **Arthropoda**
10. -----have right aortic arch:
a) Amphibians b) Reptiles c) **Birds** d) Mammals
11. -----is a bony fish:
a) Shark b) Dog fish c) **Sea horse** d) Lamprey
12. ----- are bottom dwelling fishes:
a) Sharks b) **Skates and Rays**
c) Hag fish and lamprey d) Trout and Perch
13. -----are hermaphrodite fishes:
a) Lamprey b) **Hag** c) Trout d) Rays
14. In the following mammal, hair have become modified into scales:
a) **Pangolin** b) Porcupine c) Dolphin d) Whale
15. The red blood cells of are non-nucleated -----:
a) Pisces b) Amphibians c) Aves d) **Mammals**
16. Excretory system has single glomerulus connected blood vessels. This is true for the members of Phylum:
a) Echinodermata b) Arthropoda c) **Hemichordata** d) Chordata
17. -----are anamniotes:
a) **Amphibians** b) Reptilians c) Birds d) Mammals
18. Members of the following phylum are tapering at both ends, have separate sexes and sensory papillae at the anterior end:
a) Coelenterata b) Platyhelminthes c) **Nematoda** d) Porifera
19. Collar cells are the characteristic of the members of phylum:
a) **Porifera** b) Cnidaria c) Platyhelminthes d) Nematoda
20. Polymorphism is the characteristic of the members of phylum:

a) Porifera b) Cnidaria c) Platyhelminthes d) Nematoda

21. Soft bodied worm like animals are included in the phylum:

a) Annelida b) Mollusca c) Arthropoda d) Hemichordata

22. *Amphioxus* is an example of:

a) Hemichordata b) Urochordata c) Cephalochordata d) Chordata

23. The trochophore larvae are the characteristics of the members of phylum /

phyla:

a) Annelida b) Mollusca c) Echinodermata d) Both "a" and "b"

24. Respiratory system of following is composed of gill-slits forming a dorsal row

behind collar:

a) Phylum Arthropoda b) Phylum Echinodermata

c) Phylum Hemichordata d) Phylum Mollusca

25. The members of following class have additional circular rings or markings called annuli:

a) Polychaeta b) Hirudinea c) Gastropoda d) Cephalopoda

26. Which one of these is a fish?

a) Star fish b) Jelly fish c) Cuttle fish d) Sea horse

21. Following mammals have cloaca and cloacal opening instead of separate opening

for digestive system and urinogenital systems:

a) Prototherian b) Eutherian c) Metatherian d) Placental

22. The skin is smooth and moist with many glands. Scales are absent. This is true

for:

a) Fishes b) Amphibians c) Reptilians d) Mammalians

23. Following class includes most primitive living vertebrates which are without

jaws:

a) Pisces b) Cyclostoma c) Osteichthyes d) Chondrichthyes

24. Eel-like body, Ventral Suctorial Mouth, Cartilaginous skeleton is characteristic

of:

a) Cartilaginous fishes b) Bony fishes c) Cyclostomes d) Protochordates

Chapter No: 11

1. have unstacked photosynthetic membranes which work like thylakoids:

a) Photosynthetic Prokaryotes b) Eukaryotes c) Algae d) Plants

2. Intermediate product/s in the Alcoholic Fermentations is/are:

a) CO₂ b) Acetyldehyde c) Ethyl Alcohol d) Both "a" and "b"

3. The end products of photosynthesis are:

a) Glucose b) Starch (Storage) c) Sucrose (Export) d) All these

4. **Z-scheme is also known as:**

a) Chemiosmosis

b) **Non-Cyclic**

Phosphorylation

c) Cyclic Phosphorylation

d) Oxidative

Phosphorylation

5. **Following phases of Respiration occur in the Cytoplasm:**

a) **Glycolysis**

b) Oxidation of Pyruvate

c) Respiratory Chain

d) Both "a" and "b"

6. **Stomata even if a plant is kept in a dark close:**

a) Ultimately open after every 24 hours

b) Ultimately close after every 24 hours

c) Remain closed during the period in which plant is kept in dark

d) **Both "a" and "b"**

7. **About percent of total photosynthesis is carried out by terrestrial plants:**

a) 5

b) **10**

c) 15

d) 20

8. **Where does Respiratory or Electron Transport Chain or Oxidative Phosphorylation occur?**

a) Cytoplasm

b) Matrix of Mitochondria

c) **Inner membrane of Mitochondria**

d) Outer membrane of

Mitochondria

9. **The Dark Reactions take place:**

a) **In the Stroma of Chloroplast**

b) In the Cytoplasm of Mesophyll Cell

c) In the Thylakoid Membrane of Chloroplast

d) In the Matrix of Mitochondria

10. **12. Following events take place in the Light Reactions of Photosynthesis:**

a) Photolysis of Water

b) Reduction of NADP⁺ to NADPH + H⁺

c) Synthesis of ATP by Photophosphorylation

d) **All these**

11. **Which of the following pairs is mismatched?**

a) Chlorophyll a Blue-Green

b) Carotenes Red to Orange

c) **Xanthophylls Yellow to Green**

d) Chlorophyll a Yellow-

Green

12. **-is/are involved in ATP synthesis by Chemiosmosis in Photosynthesis:**

a) Cytoplasm of Mesophyll Cells

b) Stroma

c) **Thylakoid Membrane**

d) Both "a" and "b"

Chapter No: 12

1. **Digestion is completed by the action of enzymes present in the:**

a) Bile

b) Pancreatic juice

c) Gastric juice

d)

Intestinal juice

2. **Digestion of protein occurs in the:**

a) Stomach

b) Duodenum

c) Jejunum and Ileum

d) **Both**

"a" and "c"

3. **Fleas, Lice, Ticks, Mites are all:**

a) Free living

b) Endo parasites

c) **Ecto parasites**

d)

Mutualists

4. **Both Intra cellular Digestion and Extra cellular Digestion take place in:**

a) Hydra

b) Planaria

c) Earthworm

d) **Both "a"**

and "b"

5. **What is not true for the Teeth of Herbivores?**

a) Canines are missing

b) **There is no gap between the incisors and premolars**

c) No upper incisors in some

d) Premolars and molars have large grinding surfaces

6. **Cholesterol is produced in the:**
 a) Blood b) Bone marrow c) **Liver** d) Spleen
7. **are masses of dilated, tortuous veins in the anorectal mucosa:**
 a) Ulcer b) **Hemorrhoids** c) Hemorrhages d) Haematomas
8. **Which of the following nutrients is incorrectly paired with its function?**
 a) Nitrogen Component of protein
 b) Magnesium Constituent of chlorophyll
 c) Phosphorus Component of nucleic acid
 d) **Iron Formation of cell wall**
9. **Which of the deficiency of following nutrients are matched with their effects?**
 a) Chlorosis Nitrogen or Magnesium deficiency in the soil
 b) Stunted growth of roots --- Deficiency of Phosphorous
 c) Leaves margins yellow and brown Soil deficient with Potassium
 d) **All these**
10. **plants have nodules on their roots, which contain nitrogen fixing bacteria:**
 a) Carnivorous b) Herbivorous c) **Leguminous** d) Insectivorous
11. **Bile contains:**
 a) Pepsin b) Trypsin c) Amylopsin d) **None of them**
12. **Trypsin is secreted as inactive trypsinogen which is activated by following:**
 a) Lipase b) Amino peptidase c) **Enterokinase**
 d) HCl

Chapter No: 13

1. **Capacity of hemoglobin to hold oxygen decreases due to:**
 a) Increase in CO₂ concentration b) Rise in temperature
 c) Decline in blood pH d) **All these**
2. **The heart of -never receives oxygenated blood:**
 a) **Fishes** b) Amphibians c) Reptiles d) Mammals
3. **A liter of water can not contain even -ml of oxygen:**
 a) 5 b) **10** c) 15 d) 20
4. **How much amount of CO₂ always remains in the blood?**
 a) 54 ml per 100 ml of blood b) **50 ml per 100 ml of blood**
 c) 4 ml per 100 ml of blood d) 20 ml per 100 ml of blood
5. **Following amount of air in liters always remains in the lungs during rest and exercise:**
 a) 5 and 10 b) 2 and 4 c) **4.5 and 1.5** d) 1 and 2
6. **The substance which reduces the tendency of the lungs to collapse is:**
 a) Heparin b) **Surfactant** c) Histamine d) Glutamate
7. **In blood is not involved in the transport of gases:**
 a) Earthworms b) Fishes c) **Cockroaches** d) Frogs
8. **The Photorespiration starts when:**
 a) O₂ is less b) **O₂ is more** c) CO₂ is more d) None of above
9. **In the exchange of gases occurs from environment to blood via skin:**
 a) Hydra b) Planaria c) **Earthworm** d) None of these
10. **When we are at rest, we inhale air -times per minute:**

- a) 10-20 b) 15-20 c) 5-10 d) 20-25
- 11. The number of gills in fish is:**
a) Two to three pairs b) Three to four pairs
c) Four to five pairs d) Five to six pairs
- 12. In most plants Photorespiration reduces the amount of Fixation of CO₂ into Carbohydrates by:**
a) 10% b) 20 % c) 25 % d) 30 %
- 13. Following is an allergic reaction to pollen, spores, cold, humidity, pollution etc:**
a) Emphysema b) Tuberculosis c) Lung cancer d) Asthma
- 14. Alveoli with an increased volume but decreased surface area are the characteristics of:**
a) Asthma b) Emphysema c) Lung cancer d) Tuberculosis

Chapter No: 14

- 1. The pressure exerted by the protoplast against the cell wall is called:**
a) Water potential b) Partial pressure
c) Pressure potential d) Solute potential
- 2. Root pressure generates a positive hydrostatic pressure of around KPa:**
a) 800-1000 b) 50-100 c) 100-200 d) 200-300
- 3. Examples of sink are:**
a) Immature leaves b) Developing fruits
c) Growing tips of stem and root d) All these
- 4. In all reptiles the left and right systemic arches arise from a region of ventricle called:**
a) Sinus Venosus b) Truncus Arteriosus
c) Cavum Venosum d) Conus Arteriosus
- 5. The veins from alimentary canal unite to form vein which drains blood into liver:**
a) Hepatic b) Renal c) Iliac d) Hepatic Portal
- 6. In one's life heart contracts about times without stopping:**
a) 10 million b) 3.5 million c) 2.5 billion d) 4.5 billion
- 7. Tissue Macrophages are produced from:**
a) Monocytes b) Lymphocytes b) Basophils c) Neutrophils
- 8. Lymph nodes, in humans, are present in:**
a) Neck b) Axilla c) Groin d) All these
- 10. The cross-sectional area of - is about 5000 cm²:**
a) Aorta b) Vena cava c) Capillaries d) Arteries
- 11. The sound "dubb" is made, when:**
a) Tricuspid valve is closed
b) Bicuspid valve is closed
c) Semi lunar valves at the base of pulmonary artery and aorta close

d) Both tricuspid and bicuspid valves close simultaneously

a) Stomata b) Cuticle c) **Hydathodes** d)

a) Venules b) Arterioles c) Arteries d)

a) 10 C b) 20 C c) 30 C **d)**

Entry Tests of University of Health Sciences and Other Official Tests

Chapter No: 1

a) Require oxygen for respiration
b) **Originate from pre-existing life**
c) Carry on heterotrophic nutrition
d) Carry on autotrophic nutrition

a) Symbiosis b) Saprophytism c) Parasitism d)

3) The branch of biology that deals with cell functions is called: (Entrance Self-Test-2011)

C) Molecular

D) Microbiology

A) **Organ**
B) Individual

C) Organelles
D) Molecules

A) Theory
B) **Hypothesis**
C) Scientific law
D) Statement

(Entrance Self-Test-2011)

C) Biological

D)

7) **A relationship between two or more organisms of different species in which all partners**

get benefit is called: (Entry Test 2012)

C)

D) Predation

- 8) Populations of different species (plants and animals) in the same habitat form a: (Entry Test 2012)**
 A) **Community** C) Biosphere
 B) Ecosystem D) Microhabitat
- 9) The part of body which forms a structural and functional unit and is composed of more than one tissue is called: (Entry Test 2012)**
 A) **Organ** C) Organ
 B) Organelle D) Whole organism
- 10) A method in which pests are destroyed by using living organisms or natural enemies is called: (Entry Test 2012)**
 A) Pasteurization C) **Biological control**
 B) Integrated disease management D) Genetic engineering

Chapter No: 2

- 1) Which bond is the potential source of chemical energy for cellular activities? (Entry Test 2009)**
 A) C-N C) **C-H**
 B) C-O D) O-H
- 2) Name the tissues that contain about 20% of water: (Entry Test 2009)**
 A) Nerve cells C) Brain cells
 B) **Bone cells** D) None of these
- 3) Which of the following gives blue color with iodine? (Entry Test 2009)**
 A) **Starch** C) Glycogen
 B) Cellulose D) All of these
- 4) The two strands in the DNA are coiled -to each other: (Entry Test 2009)**
 A) Parallel C) Both A and B
 B) **Anti-parallel** D) None of these
- 5) Name the human tissues that contain about 85 % water: (Entry Test 2009)**
 A) Nerve cells C) **Brain cells**
 B) Bone cells D) None of these
- 6) When to glucose ($C_6H_{12}O_6$) molecules are combined to form a molecule of maltose ($C_{12}H_{22}O_{11}$), the formula of maltose is not $C_{12}H_{24}O_{12}$ because: (NSTC-8-Sample paper 2010-2012)**
 a) **Hydrolysis takes place**
 b) Dehydration synthesis takes place
 c) Transpiration takes place
 d) Water is added
- 7) Of the following terms, the one that includes all others is: (NSTC-8-Sample paper 2010-2012)**
 a) Oxidation b) Respiration
 c) **Metabolism** d) Pollination
- 8) Messenger RNA is important in protein synthesis because it: (NSTC-8-Sample paper 2010-2012)**
 a) Contains the 20 essential amino-acids
 b) Carries code from DNA to nucleus
 c) **Carries the code from DNA to ribosome**
 d) Is transmitted to the nucleotide

- 9) **One similarity of DNA and RNA is that they both contain:** (NSTC-8-Sample paper 2010-2012)
 a) **Nucleotide** b) ATP c) Thymine d) Deoxyribose sugar
- 10) **Genetic information is transmitted from DNA to:** (NSTC-8-Sample paper 2010-2012)
 a) Amino acids b) Chromosomes
 c) Proteins d) **The site of protein synthesis**
- 11) **The most abundant carbohydrate in nature is:** (Entrance Self-Test-2011)
 A) **Cellulose** C) Fructose
 B) Glycogen D) Starch
- 12) **The basic element of all organic compounds is:** (Entrance Self-Test-2011)
 A) Oxygen C) Hydrogen
 B) Nitrogen d) **Carbon**
- 13) **Terpenoids are important group of compounds that are made up of simple repeating units:** (Entrance Self-Test-2011)
 A) Acylglycerols C) Phospholipids
 B) **Isoprenoids** D) Ketones
- 14) **The number of types of amino acids that are found to occur in cells are:** (Entrance Self-Test-2011)
 A) 20 C) 100
 B) 25 d) **170**
- 15) **The major RNA in the cell is ribosomal RNA. It makes up:** (Entrance Self-Test-2011)
 A) **80 % of total RNAs** C) 90 % of total RNAs
 B) 58 % of total RNAs D) 40 % of total RNAs
- 16) **Carbohydrates are organic molecules and contain three elements:** (Entry Test 2012)
 A) Carbon, water and oxygen C) Carbon, calcium and hydrogen
 B) Carbon, sulphur and hydrogen d) **Carbon, hydrogen and oxygen**
- 17) **Which one are intermediates in respiration and photosynthesis both:** (Entry Test 2012)
 A) Ribose and heptolose C) Glucose and galactose
 B) **Glyceraldehyde and dihydroxyacetone** D) Fructose and ribulose
- 18) **Which of the following is a peptide bond?** (Entry Test 2012)
 A) **--C—N** C) --C—P
 B) --C—O D) --C—S
- 19) **Which of the following is an unsaturated fatty acid:** (Entry Test 2012)
 A) Acetic acid C) **Oleic acid**
 B) Butyric acid D) Palmitic acid
- 20) **Which of the following combination of base pair is absent in DNA?** (Entry Test 2012)
 A) A—T C) **A -U**
 B) C—G D) T—A

Chapter No: 3

- 1) **The optimum temperature for enzymes in human body is:** (Entry Test 2009)
 A) 32 F C) 313 K
 B) 46 C d) **37 C**
- 2) **Biochemically enzymes are:** (Entrance Self-Test-2011)
 A) Carbohydrates C) Hormones

- B) Fatty acids **D) Proteins**
- 3) The presence of enzymes: (Entrance Self-Test-2011)**
- A) Slows down the rate of reaction C) Does not show any change
- B) Increases the rate of reaction** D) Completely stops the reaction
- 4) Lock and Key Model of enzyme reacting with substrate was originally proposed by:**
- (Entrance Self-Test-2011)
- A) Emil Fisher C) Robert Hook
- B) Koshland D) Robert Brown
- 5) Optimum pH for pepsin to work efficiently is: (Entrance Self-Test-2011)**
- A) 4.50 C) 6.80
- B) 2.00** D) 9.00
- 6) The type of inhibition in which inhibitor has no structural similarity to substrate and combines with enzyme at other than the active site is called: (Entry Test 2012)**
- A) Irreversible inhibition **C) Non-competitive and reversible inhibition**
- B) Competitive inhibition D) Reversible inhibition
- 7) The inhibitors that bind tightly and permanently to enzymes and destroy their globular structure stopping their catalytic activity are: (Entry Test 2012)**
- A) Reversible inhibitors C) Competitive inhibitors
- B) Irreversible inhibitors** D) Non-competitive inhibitors
- 8) Enzyme succinate dehydrogenase converts succinate into: (Entry Test 2012)**
- A) Malate C) Citrate
- B) Malonic acid **D) Fumarate**
- 9) If detachable co-factor is an inorganic ion then it is designated as: (Entry Test 2012)**
- A) Coenzyme C) Holoenzyme
- B) Prosthetic group **D) Activator**

Chapter No: 4

- 1) Which of the following are colorless? (Entry Test 2009)**
- A) Chloroplasts **C) Leucoplasts**
- B) Chromoplasts D) None of these
- 2) Which of the following is most slender in structure? (Entry Test 2009)**
- A) Microtubules C) Intermediate filaments
- B) Microfilaments** D) Both A and B
- 3) Soluble part of the cytoplasm is termed as: (Entry Test 2009)**
- A) Cisterna C) Endocytosis
- B) Cytosol** D) Both A and B
- 4) Which of the following modifies proteins and lipids by adding carbohydrates?**
- (Entry Test 2009)
- A) **Golgi Apparatus** C) Plasma membrane
- C) Polysome D) None of these
- 5) The nucleus contains: (NSTC-8-Sample paper 2010-2012)**
- a) Mitochondria b) Cytosol c) Enzyme **d) DNA**
- 6) Another name for Golgi complex is: (NSTC-8-Sample paper 2010-2012)**
- a) Dictyosome** b) Endoplasmic Reticulum
- c) Cyto-membrane system d) None of the above
- 7) Leucoplasts are a kind of: (NSTC-8-Sample paper 2010-2012)**
- a) Lysosomes b) Chloroplasts **c) Plastids** d) Grannum
- 8) Vacuole in plants is responsible for: (NSTC-8-Sample paper 2010-2012)**

- a) Photosynthesis
c) **Turgor pressure**

b) Cellular excretion
d) Starch storage

9) By which of the following can movements of materials across animal cell membranes be accomplished? (NSTC-8-Sample paper 2010-2012)

I Active transport
II Diffusion
III Pinocytosis

a) I only
b) II only
c) I and II only
d) All of the above

10) Cell membranes are composed of: (NSTC-8-Sample paper 2010-2012)

a) Lipids and proteins
b) Phospholipids
c) Proteins and carbohydrates
d) Lipids and terpenoids

11) Hydrogen peroxide degradation in a cell is a function of: (NSTC-8-Sample paper 2010-2012)

a) Lysosomes b) Ribosomes c) Mitochondria d)

Microbodies

12) A cell wall is present only in all: (NSTC-8-Sample paper 2010-2012)

a) Bacteria b) Protozoa c) Algae d) Viruses

13) Robert Hook was the first person to see cells in: (Entrance Self-Test-2011)

A) Various plants C) Fungi
B) Animals D) Cork

14) The concept "*OMNIS cellula-e-cellula*" means that, new cells are formed from:

(Entrance Self-Test-2011)

A) Non living material C) Pre-existing living cells
B) Dead organic matter D) As a result of chemical reactions

15) In generalized plant cell the nucleus is: (Entrance Self-Test-2011)

A) Present in the middle of the cell C) Absent
B) Displaced to the site of the cell D) Modified into endoplasmic reticulum

16) Plasma membrane is found in the cells of: (Entrance Self-Test-2011)

A) Animals only C) Both in plants and animals
B) Plants only D) Bacteria only

17) The semi-circular channels and system of tubes found in the cytoplasm are known as:

(Entrance Self-Test-2011)

A) Ribosomes C) Endoplasmic reticulum
B) Glyoxisomes D) Vacoules

18. The structures that are involved in the manufacture and supply of energy to the cell are: (Entrance Self-Test-2011)

A) Centrioles C) Nucleolus
B) Plastids D) Mitochondria

19) In a plant cell chlorophyll is present in: (Entrance Self-Test-2011)

A) Chromoplasts C) Stroma
B) Leucoplasts D) Chloroplasts

20) Ribosomes have equal amount of:

A) DNA and Protein C) mRNA and Protein
B) RNA and Protein D) None

21) Plastids are only found in the: (Entry Test 2012)

A) Animals and plants C) Plants
B) Animals D) Viruses

22) Plasma membrane is chemically composed of: (Entry Test 2012)

A) Phospholipids only C) Lipids and carbohydrates
B) Lipids and proteins D) Glycoproteins

9) By which of the following can movements of materials across animal cell membranes be

- | | | | |
|------------|-------------------------|-----------|-------------------------|
| I | Active transport | a) | I only |
| II | Diffusion | b) | II only |
| III | Pinocytosis | c) | I and II only |
| | | d) | All of the above |

10) Cell membranes are composed of: (NSTC-8-Sample paper 2010-2012)

11) Hydrogen peroxide degradation in a cell is a function of: (NSTC-8-Sample paper 2010-2012)

Microbodies

- a) Bacteria b) Protozoa c) **Algae** d) Viruses

13) Robert Hook was the first person to see cells in: (Entrance Self-Test-2011)

14) The concept “*OMNIS cellula-e-cellula*” means that, new cells are formed from:

- A) Non living material
B) Dead organic matter
C) **Pre-existing living cells**
D) As a result of chemical

reactions

- A) Present in the middle of the cell
B) **Displaced to the site of the cell**
C) Absent
D) Modified into

endoplasmic reticulum

- A) Animals only
- B) Plants only
- C) Both in plants and animals
- D) Bacteria only

17) The semi-circular channels and system of tubes found in the cytoplasm are known as:

- A) Ribosomes
B) Glyoxisomes
C) Endoplasmic
D) Vacuoles

18. The structures that are involved in the manufacture and supply of energy

- A) Centrioles
B) Plastids
C) Nucleolus
D) Mitochondria

19) In a plant cell chlorophyll is present in: (Entrance Self-Test-2011)

20) Ribosomes have equal amount of:

21) Plastids are only found in the: (Entry Test 2012)

22) Plasma membrane is chemically composed of: (Entry Test 2012)

- B) Lipids and proteins**

- 23) **Endoplasmic reticulum contains a system of flattened membrane-bounded sacs which are named as: (Entry Test 2012)**
 A) Cristae C) Cisternae
 B) Matrix D) Tubules
- 24) **Lipids synthesis / metabolism takes place in which of the following organelle? (Entry Test 2012)**
 A) Mitochondria C) Rough endoplasmic reticulum
 B) Vacoules D) Smooth endoplasmic reticulum
- 25) **Ribosomes exist in two forms, either attached with the RER or freely dispersed in the: (Entry Test 2012)**
 A) Tonoplasts C) Cytoplasm
 B) Golgi bodies D) SER
- 26) **The ribosomal RNA is synthesized and stored in: (Entry Test 2012)**
 A) Endoplasmic reticulum C) Golgi complex
 B) Nucleolus D) Chromosomes

Chapter No: 5

- 1) **Name the enveloped RNA virus that causes infusion hepatitis: (Entry Test 2009)**
 A) HBV C) HCV
 B) HAV D) None of these
- 2) **Of the following terms, which one includes all the others? (NSTC-8-Sample paper 2010-2012)**
 a) Species b) Class c) Phylum d) Order
- 3) **An independent organism is discovered that does not contain a nucleus. In all likelihood, it would be classified in the kingdom: (NSTC-8-Sample paper 2010-2012)**
 a) Monera b) Protista c) Fungi d) Animal
- 4) **Bacteriophages are: (NSTC-8-Sample paper 2010-2012)**
 a) Parasitic bacteria b) Spore forming bacteria
 c) Virus attacking bacteria d) None of the above
- 5) **Bacteriophages exhibit life cycle that are: (NSTC-8-Sample paper 2010-2012)**
 a) Lytic b) Lysogenic c) Niether a nor b d) Both a and b
- 6) **Viruses are simplest organisms and: (Entrance Self-Test-2011)**
 A) Have their own enzymes
 B) Have cell membrane but not cell wall
 C) Undergo cell division
 D) Are only DNA or RNA particles without cellular structure
- 7) **Herpes simplex is caused by --virus: (Entry Test 2009)**
 A) DNA C) Glycogen
 B) RNA tumor D) Both B and C
- 8) **In HIV viruses, reverse transcriptase convert single stranded RNA into double stranded viral DNA. This process is called: (Entry Test 2012)**
 A) Translation C) Replication
 B) Duplication D) Reverse transcription

Chapter No: 6

- 1) **Which of the following are spiral-shaped bacteria? (Entry Test 2009)**
 A) Cocci C) *Pseudomonas*
 B) Bacilli D) *Vibrio*

- 2) **Name the structure involved in DNA replication: (Entry Test 2009)**
 A) Cysts C) Ribosomes
B) Mesosomes D) Spores
- 3) **Name the Cyanobacteria which are helpful in fixing atmospheric nitrogen: (Entry Test 2009)**
 A) Heterocyst C) Akinetes
B) Nostoc D) Hormogonium
- 4) **The most ancient bacteria are: (Entrance Self-Test-2011)**
 A) Eubacteria C) Escherichia coli
B) Archaeobacteria D) Streptococci
- 5) **The bacteria that cause diseases in human beings, are called: (Entrance Self-Test-2011)**
 A) Photosynthetic bacteria C) Facultative bacteria
 B) Chemosynthetic bacteria **D) Pathogenic bacteria**
- 6) **Chemicals produced by microorganisms which are capable of destroying the growth of microbes are called: (Entry Test 2012)**
 A) Antigens C) Antiseptics
 B) **D) Antibiotics**
- 9) **Most widespread problem of antibiotics misuse is: (Entry Test 2012)**
 A) Rapid outbreak C) Disturbance of metabolism
B) Increased resistance in pathogens D) Immunity
- 10) **Mesosomes are infoldings of the cell membrane and are involved in: (Entry Test 2012)**
 A) **DNA replication** C) Protein synthesis
 B) RNA synthesis D) Metabolism

Chapter No: 7

- 1) **The African sleeping sickness is caused by -: (Entry Test 2009)**
 A) *Entamoeba histolytica* C) Zooflagellates
B) Trypanosoma D) Ciliates
- 2) **Which of the following may build coral reefs along with coral animals? (Entry Test 2009)**
 A) Myxomycota C) Green algae
 B) Brown algae **D) Red algae**

Chapter No: 8

- 1) **In general asexual reproduction is common in: (Entry Test 2009)**
 A) Humans C) **Deuteromycota**
 B) Basidiomycota D) Basidiospores
- 2) **Which of the following is used for lowering blood cholesterol? (Entry Test 2009)**
 A) Neurospora C) Aspergillus
 B) Grisofulvin **D) Lvastatin**
- 3) **Name the nutrition resulted by feeding on dead and decaying matter: (Entry Test 2009)**

- A) **Saprophytes**
B) Parasitic

- C) Symbiotic
D) Both B and

C

4) **The mutualistic association between certain fungi and roots of vascular plants is called:**

(Entrance Self-Test-

2011)

- A) Lichens
B) Parasitism

- C) Budding
D) **Mycorrhizae**

5) **Which of the following component is found in the cell wall of fungi?**

(Entry Test 2012)

- A) Cellulose
B) **Chitin**

- C) Proteins
D) Glycerol

Chapter No: 9

1) **Which of the following has rootless sporophytes? (Entry Test 2009)**

- A) **Psilopsida**
B) Tracheophyta

- C) Lycopsidea
D)

Sphenopsida

2) **Name the class that contains seedless plants: (Entry Test 2009)**

- A) Angiospermae
B) Gymnosperm

- C) Paraphysis
D) **Filicinae**

3) **Which of the following does not belong to angiosperm family? (Entry Test 2009)**

- A) **Picea**
B) Poaceae

- C) Rosaceae
D) Fabaceae

4) **From what part of plant does a seed develop? (NSTC-8-Sample paper 2010-2012)**

- a) Hilum b) Anther c) Oviduct d)

Ovule

5) **The structure that includes all others is: (NSTC-8-Sample paper 2010-2012)**

- a) Ovary b) Ovule c) Style d)

Pistil

6) **A seven structure with 8 nuclei is: (NSTC-8-Sample paper 2010-2012)**

- a) Stamen b) Ovary c) **Embryo sac** d)

Seed

7) **Nectar: (NSTC-8-Sample paper 2010-2012)**

- a) Provides nourishment to the plants
b) Kills germs
c) **Attracts pollinators**
d) Is sweet

8) **Pollen grain develops from haploid microspores then later develops into sperm bearing:**

(NSTC-8-Sample paper 2010-2012)

- a) **Gametophyte** b) Sporophyte c) Megaspore d)

Pollem sac

9) **Double fertilization is characteristic of: (NSTC-8-Sample paper 2010-2012)**

- a) Fungi b) **Flowering plant** c) Roses d)

Algae

10) **Triploid endosperms nucleus is a result of: (NSTC-8-Sample paper 2010-2012)**

- a) Mitosis b) Cross pollination
c) Self-pollination d) **Double fertilization**

11) **The name *Nicotiana tabacum* is given to: (Entrance Self-Test-2011)**

- A) Potato C) Red pepper
B) Tomato D) **Tobacco**

12) **Family Gramineae has: (Entrance Self-Test-2011)**

- A) Only wheat C) Only rice
B) Only corn D) **All of these**

13) **Male reproductive parts of the flower are called: (Entry Test 2012)**

- A) Gynoecium C) **Androcium**

B) Calyx

D) Corolla

Chapter No: 10

- 1) **Sharks and rays are included in class: (Entry Test 2009)**
A) Cyclostoma C) Osteichthyes
B) **Condriichthyes** D) Tetrapoda
- 2) **Name the vertebrates which are without jaws: (Entry Test 2009)**
A) Osteichthyes C) Chondrichthyes
B) **Cyclostoma** D) None of these
- 3) **Which of the following are called placental mammals? (Entry Test 2009)**
A) Prototheria C) Metatheria
C) **Eutheria** D) All of these
- 4) **Name the class without antenna: (Entry Test 2009)**
A) **Arachnida** C) Insecta
B) Myriapoda D) Crustacea
- 5) **Which of the following damages wooden ships? (Entry Test 2009)**
A) Sepia C) **Teredo**
B) Limax D) Ostrich
- 6) **Which of the following do not have a body cavity? (Entry Test 2009)**
A) Pseudocoelomata C) Coelomata
B) **Acoelomata** D) None of these
- 7) **The sponges which belong to phylum Porifera have: (Entrance Self-Test-2011)**
A) **Maximum capacity to regenerate** C) Moderate capacity to regenerate
B) Very little capacity to regenerate D) No regeneration capacity
- 8) **The platyhelminthes liver fluke is: (Entrance Self-Test-2011)**
A) Ectoparasite in humans C) Parasite of respiratory tract
B) Blood parasite D) **Parasite in the bile duct**
- 9) **Which of the following is of economic importance to man: (Entrance Self-Test-2011)**
A) Daphnia C) **Silkworm**
B) Millipede D) Scorpion
- 10) **Fasciola is the name given to: (Entry Test 2012)**
A) Tapeworm C) **Liver fluke**
B) Planaria D) Earthworm
- 11) **Ascaris is: (Entry Test 2012)**
A) Diploblastic C) Maptoic
B) **Triploblastic** D) Acoelomate
- 12) **During development, in an animal, mesoderm layer gives rise to: (Entry Test 2012)**
A) Nervous system C) **Muscular and skeletal system**
B) Alimentary canal lining D) Mouth
- 13) **Polymorphism is characteristic feature of: (Entry Test 2012)**
A) Porifera C) Annelida
B) **Cnidaria** D) Nematodes

Chapter No: 11

- 1) **In what stage of aerobic respiration are 2+ carbon molecules oxidized completely to carbon dioxide? (Entry Test 2009)**
A) Glycolysis C) **Kreb' cycle**
B) ETC D) Calvin cycle
- 2) **Chlorophylls absorb mainly wave length: (Entry Test 2009)**

- A) Yellow
C) Green
- 3) Which form of anaerobic respiration occurs in muscle cells of humans and other animals during extreme physiological activities? (Entry Test 2009)**
A) Alcoholic fermentation
B) Lactic acid fermentation
C) Glycolysis
D) Pyruvic oxidation
- 5) In which of the following life processes is ATP produced? (NSTC-8-Sample paper 2010-2012)**
I Photosynthesis
II Aerobic respiration
III Anaerobic respiration
a) I only
b) II only
c) I and II only
d) I, II and III
- 6) Red corpuscles to haemoglobin as chloroplasts are to: (NSTC-8-Sample paper 2010-2012)**
a) Guard cells
b) Palisade cells
c) Chlorophyll
d) Photosynthesis
- 7) Which of the following is not the end product of glycolysis: (Entrance Self-Test 2011)**
A) Pyruvate
B) ATP
C) Oxaloacetate
D) Reduced NAD
- 8) Which of the following does occur for the formation of acetyl Co-A from pyruvate: (Entrance Self-Test-2011)**
A) Decarboxylation
B) Hydrogenation
C) Carboxylation
D) Deamination
- 9) At the beginning of Krebs's cycle acetyl Co-A combines with which substrate to form citrate (6-C): (Entrance Self-Test-2011)**
A) Oxaloacetate
B) Oxoglutarate
C) Fumarate
D) Succinate
- 10) Which of the following is not the end product of non-cyclic photophosphorylation: (Entrance Self-Test-2011)**
A) Reduced NADP
B) ATP
C) O₂
D) CO₂
- 11) Which of the following are the end products of light dependent stage, used in the Calvin cycle to change glycerate 3-phosphate into triose phosphates: (Entrance Self-Test-2011)**
A) NADP + ATP
B) ATP
C) RuBP + ATP
D) O₂ + NADPH
- 12) The product(s) of cyclic phosphorylation is / are: (Entry Test 2012)**
A) ATP
B) NADP
C) NADP and ATP
D) NADP, ATP and O₂
- 13) Total NADH formed by one glucose molecule during Krebs's Cycle are: (Entry Test 2012)**
A) 6
B) 4
C) 8
D) 18
- 14) The end product glycolysis is: (Entry Test 2012)**
A) ADP
B) Reduced FAD
C) Citric acid
D) Pyruvate
- 15) The terminal electron acceptor in electron transport chain is: (Entry Test 2012)**
A) Hydrogen
B)
C) Cytochrome
D) Oxygen
- 16) One molecule of FADH₂ is produced in Krebs's cycle during conversion of: (Entry Test**

2012)

- A) Fumarate Malate
B) **Succinate Fumarate**

- C) Malate Oxaloacetate
D) Ketaglutarate

Succinate

Chapter No: 12

1) **Name the neurotic disorder characterized by bouts of over eating of fattening foods:**

(Entry Test 2009)

- A) **Bulimia nervosa**

- C) Anorexa

nervosa

- B) Dyspepsia

- D) Salmonella

2) **Pancreas is a:** (Entrance Self-Test-2011)

- A) Part of Stomach

- C) Part of

Large intestine

- B) Part of Small intestine

- D) Separate**

Gland

3) **During swallowing the food travels from oral cavity to the stomach by way of**

oesophagus: (Entrance Self-Test-2011)

- A) Very quickly

- C) Pushed down by

pharynx

- B) By antiparistalsis

- D) Moving due to**

peristalsis

4) **The term chyme is applied to:** (Entrance Self-Test-2011)

- A) Semi digestive food in oral cavity

- B) Semi-solid food in stomach**

- C) Semi digested food in the small intestine

- D) Completely digested food in the last part of small intestine

5) **Villi and micro villi are present:** (Entrance Self-Test-2011)

- A) In pharynx

- C) In oesophagus

- B) In small intestine (jejunum)**

- D) In large

intestine

6) **Gastrin is the hormone which is produced by the:** (Entry Test 2012)

- A) Liver

- C) Pyloric region of**

stomach

- B) gland

- D) Mucosal lining of

intestine

7) **Bacteria and fungi are examples of:** (Entry Test 2012)

- A) Producers

- C) Consumers

- B) Decomposers

- D) Detritivores

8) **The muscles of the stomach walls thoroughly mix up the food with gastric juices and the**

resulting semi-solid / semi liquid material is called: (Entry Test 2012)

- A) Bolus

- C) Mucus

- B) Bolus or chyme

- D) Chyme**

9) **Trypsinogen is converted into trypsin by the activity of:** (Entry Test 2012)

- A)

- C) Enterokinase**

- B)

- D) Peptidase

10) **In large intestine, vitamin K is formed by the activity of:** (Entry Test 2012)

- A) **Symbiotic bacteria**

- C) Parasitic

bacteria

- B) Obligate parasite

- D) Facultative

bacteria

11) **Goblet cells secrte:** (Entry Test 2012)

- A) HCl

- C) Enzymes

- B) Mucus**

- D) Amylase

Chapter No: 13

- 1) Which of the following does not have specialized respiratory organs?
(Entry Test 2009)
A) Hydra C) Cockroach
B) Birds D) Both A and B
- 2) When carbon dioxide pressure increases the capacity of Hemoglobin to hold oxygen :
(Entry Test 2009)
A) Increases many folds C) Remains constant
B) Decreases D) Is doubled
- 3) The total inside capacity of lungs of adult human beings when fully inflated is: (Entry Test 2009)
A) 5 ml C) 500 ml
B) 50 ml D) 5000 ml
- 4) Exchange of gases during organismic respiration is carried out by:
(Entrance Self-Test-2011)
A) Diffusion C) Osmosis
B) Active transport D) Facilitated Diffusion
- 5) Opening in the oral cavity (throat) through which air enters the wind pipe is called:
(Entrance Self-Test-2011)
A) Glottis C) Larynx
B) Bronchus D) Pharynx
- 6) The double layer of thin membranes which line and cover lungs are called: (Entrance Self-Test-2011)
A) Diaphragm C) Pleura
B) Alveoli D) Bronchioles
- 7) Transportation of oxygen from lungs to the tissue cells is by means of:
(Entrance Self-Test-2011)
A) Complete blood C) Red blood cells
B) Lymph D) White blood cells
- 8) What is the residual volume of air which always remains inside the lung of human?
(Entry Test 2012)
A) 2.5 litres C) 5.0 litres
B) 0.5 litres D) 1.5 litres

Chapter No: 14

- 1) The dew drops on the tips of grass leaves is an example of: (Entry Test 2009)
A) Infestation C) Exudation
B) Bleeding D) Imbibition
- 2) The attraction among water molecules which hold water together is called:
(Entry Test 2009)
A) Tension C) Cohesion
B) Adhesion D) Imbibition
- 3) The chemical nature of antibody is: (Entrance Self-Test-2011)

- A) Glycoprotein C)
Lipoproteins
B) Glycolipids D)
Polysaccharide
- 4) Which chemicals are secreted by T-helper cells to stimulate B-plasma cells to divide:**
(Entrance Self-Test-2011)
A) Interferons C)
Histamines
B) Cytokinins D) Fibrin
- 5) Which of the following is described as vaccination: (Entrance Self-Test-2011)**
A) Artificial active immunity C) Artificial
passive immunity
B) Natural active immunity D) Natural
passive immunity
- 6) B-lymphocytes and T-lymphocytes are formed: (Entrance Self-Test-2011)**
A) Before birth in bone marrow C) After maturity
in blood
B) Before birth in thymus glands D) After birth in
blood
- 7) The antibodies provided to infant through mother's milk is an example of: (Entrance Self-Test-2011)**
A) Natural passive immunity C) Natural
active immunity
B) Artificial passive immunity D) Artificial
active immunity
- 8) Antigen is a foreign or any other molecule which stimulates the formation of : (Entry Test 2012)**
A) NHC complex C) Mucus
B) Immunogen D)
- Antibodies**
- 9) Antibodies are produced by which of the following lymphocytes? (Entry Test 2012)**
A) B lymphocytes C) T
lymphocytes
B) A lymphocytes D) B and T
lymphocytes
- 10) Skin and mucus membranes are part of the body defense system and they form the:**
(Entry Test 2012)
A) Physical barriers C) Chemical
barriers
B) Mechanical barriers D) Biological
barriers
- 11) T-lymphocytes become mature and complete under the influence of:**
(Entry Test 2012)
A) Liver C) Thymus
gland
B) Bursa of fabricus D) Spleen
- 11) Snake bite is treated with which type of immunization? (Entry Test 2012)**
A) Active C) Humoral
B) Passive D) Specific
- 12) Mature mammalian red blood cells do not have: (Entry Test 2012)**
A) Nucleus C) Fluids
B) Red color D) Haemoglobin
- 13) In normal person plasma contributes about by volume of blood: (Entry Test 2012)**
A) 30 % C) 45 %

- 14) Which vein has oxygenated blood? (Entry Test 2012)

B) 90 %

A) Femoral vein

B) Subclavian vein

D) 55 %

C) Pulmonary

D) Jugular vein

(B) Subjective

Time 3:10 hours

Total

Marks: 83

This part includes three sections i.e Section II, Section III and Section IV.

SECTION II

Short Questions

Each question carries 2 Marks

Q. to be asked 33

Q. to be attempted 22

Total Marks: 22 x 2 = 44

Section II of Short Questions consists of three questions i.e

Question No: 2

Q. to be asked 12

Q. to be attempted 8

Marks: (8 x 2 = 16)

Question No: 3

Q. to be asked 12

Q. to be attempted 8

Marks: (8 x 2 = 16)

Question No: 4

Q. to be asked 9

Q. to be attempted 6

Marks: (6x 2 = 12)

Number/s of Question/s to be asked from each Chapter

| | |
|----------------------------------|-------------------------|
| Chapter No: 1 -2 Short Questions | Chapter No: 9 2 SQ s |
| Chapter No: 2 -1 Short Question | Chapter No: 10 --4 SQ s |
| Chapter No: 3 -3 Short Questions | Chapter No: 11 --2 SQ s |
| Chapter No: 4 -2 Short Questions | Chapter No: 12 --3 SQ s |
| Chapter No: 5 -1 Short Question | Chapter No: 13 --4 SQ s |
| Chapter No: 6 -1 Short Question | Chapter No: 14 --2 SQ s |
| Chapter No: 7 -4 Short Questions | |
| Chapter No: 8 -2 Short Questions | |

Model Paper of Multan Board Session 2012-2013 and onwards

Section I

- Q.2 Attempt any EIGHT short questions. (8x2=16)
- i. Define the biological method.
 - ii. Differentiate between theory and law.
 - iii. Define conjugated molecules with two examples.
 - iv. Define apoenzyme and holoenzyme.
 - v. Define cofactor and write its functions.
 - vi. Compare competitive and non competitive inhibitor.
 - vii. Differentiate between diploblastic and triploblastic animals.
 - viii. Define blastocoel.
 - ix. Write any two beneficial effects of insects.
 - x. Differentiate between coelomate and acoelomate.
 - xi. Differentiate between systole and diastole.
 - xii. What do you know about blue babies?
- Q.3 Attempt any EIGHT short questions. (8x2=16)
- i. Define pili with their functions.
 - ii. Describe briefly about giant amoeba.
 - iii. Draw the life cycle of *Plasmodium*.
 - iv. Write down any two characteristics of Ciliates.
 - v. Define Kelps. With which group it belongs.
 - vi. Compare microphyll with megaphyll leaves.
 - vii. Write the significance of double fertilization.
 - viii. What are accessory pigments? Write their significance.
 - ix. Define glycolysis and how many ATP molecules are formed in this process.
 - x. Define adipose tissues. How are they formed?
 - xi. What is hunger pang? Write its reason.
 - xii. Write two side effects of obesity.
- Q.4 Attempt any SIX short questions. (6x2=12)

- i. Write the main points of cell theory.
- ii. Write the method to calculate the magnification power of compound microscope.
- iii. Write down botanical names of Amaltas and Brinjal.
- iv. Define dikaryotic hyphae.
- v. Compare besidiospores with ascospores.
- vi. Compare myoglobin with haemoglobin.
- vii. Briefly describe Asthma.
- viii. Write the role of nose in man.
- ix. Define respiratory distress syndrome.

Short Questions From Exercise

Chapter No: 1

1. What do you mean by hypothesis?

A hypothesis is a tentative explanation of observations, which is formulated by scientists as per experience and background knowledge of the event. Or It is an elementary statement of observed facts.

2. How does law differ from theory?

| Theory | Law |
|---|---|
| 1. It is a series of hypotheses supported by results of many tests. | 1. It is a theory which proved to be true under all tested circumstances. |
| 2. It may suggest new and different hypotheses. | 2. It is a virtually irrefutable theory. |
| 3. It may change into law. | 3. It is uniform and constant fact of nature which can not be changed. |

3. What is deduction?

Deduction is a logical consequence of a statement (hypothesis) which is helpful to answer a question / problem.

4. Define vaccination.

Vaccination is the inoculation of human body with inactive or weakened pathogens or pathogenic products called vaccine in order to stimulate active acquired immunity.

5. Write a short note on cloning.

- A) **Definition:**
Cloning is the production of duplicate copies of genetic material (DNA), cells or entire multi-cellular organism, all derived from a common ancestor.
- B) **Introduction: -**
1. Cloning is a technology for achieving eugenic aims.

2. A clone is defined as a DNA, a cell or individual and all its asexually produced off-springs.
3. All members of a clone are genetically identical except when mutation occurs.

C) Types of Cloning:

Cloning is of two types:

a) Natural cloning: -

Generally no normal animal cell reproduces naturally by Cloning. Several insects and many plants do in some circumstances, whereas few do so regularly.

b) Artificial cloning: -

Artificial cloning has long been a focus of attention in biological sciences. Biologists have successfully cloned mice and cows. Recently in 1997, scientists in Scotland have succeeded in cloning a Dolly sheep. Clones of cattle, horses and other farm animals have also been obtained. At some places scientists are also making attempt to clone human embryo (a controversial issue).

D) Methods of cloning:

Following two methods are used in cloning.

- a) Replacement of nucleus of zygote by another nucleus of the same organism.

Examples: Cloning of Dolly sheep, mice and cows._

b) Separation of cells of embryo to form more embryos.

Examples: Cloning of cattle and other farm animals.

Chapter No: 2

1. Name the carbohydrates suitable as food for man.

The carbohydrates suitable as food for man are:

- a) **Glucose** Found in ripe fruits, sweet corn, honey etc.
- b) **Fructose** — Found in fruits, sugar-cane etc.
- c) **Galactose** -Found largely in combined state in lactose (milk).
- d) **Sucrose** Found in most plants and is stored in large amount in sugar cane and beet root
- e) **Lactose**--Found solely in milk.
- f) **Maltose**--Does not occur abundantly in nature and can be extracted from malt, which is prepared from sprouting barley.
- g) **Starch** -Found in cereals, legumes, potatoes and vegetables.
- Note:** It is sufficient to write only the names of carbohydrate

2. Why are fats considered as high energy compounds?

Fats are considered as high energy compounds because of:

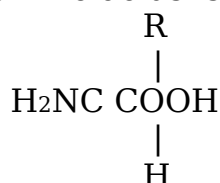
- a) Higher proportion of C-H bonds:
- b) Very low proportion of

3. What is the function of mRNA?

It carries the genetic information from DNA to ribosome, where amino acids are arranged according to the information in mRNA to form specific protein molecule.

4. What is the general formula for amino acids?

The general formula for amino acids is as:



5. What is the percentage of water in brain cells of man?

The percentage of water in brain cells of man is 85.

Chapter No: 3

1. List two conditions that destroy enzymatic activity by disrupting bonds between the atoms in an enzyme.

High temperature above the optimum conditions and extreme changes in the pH destroy enzymatic activity by disrupting bonds between the atoms in an enzyme.

2. How do low and high temperature, respectively effect an enzyme activity?

The enzyme activity is maximum at a specific temperature called Optimum Temperature, above and below this temperature its rate of reaction decreases. At very high temperatures, enzymes are destroyed (de-natured) but at very low temperature enzymes are not destroyed.

3. What is a prosthetic group?

A prosthetic group is an essential co-factor (non-protein part) that is attached covalently to the enzyme.

4. Define inhibitors of enzyme.

1. Inhibitors are molecules that attach themselves to enzymes in place of substrates.
2. They decrease the enzymes ability to form enzyme inhibitor complexes and hence no products are formed.
3. They inhibit the enzyme activity permanently or temporarily.

5. How does an enzyme accelerate a metabolic reaction?

Enzyme lowers the amount of activation energy needed .The reduction in activation energy, by the enzyme, accelerates a metabolic reaction.

Chapter No: 4

1. Describe various movements involved in transport of materials across the cell membrane.

Following movements are involved in the transport of material across the cell membrane:

- a) **Diffusion**-Movement of solute particles across the membrane from higher to lower concentration
- b) **Osmosis**—Movement of solvent molecules (e.g.Water) across the membrane from

- higher to lower concentration
- c) **Facilitated diffusion**—Movement of ions or molecules across the membrane from higher to lower concentration by carrier proteins.
- d) **Active Transport**—Movement of ions or molecules across the cell membrane against the concentration gradient i.e. from lower to high concentration at the cell's metabolic energy -ATP.

Note: It is sufficient to write only the names of the movements.

2. **State various structural modifications in a cell involved in secretions.**
Following structural modifications occur in a cell involved in secretions:
- Proteins are modified into glycoproteins by the addition of carbohydrates.
 - Lipids are modified into glycolipids by the addition of carbohydrates.
 - Polysaccharides are also formed.
3. **List the processes blocked by mitochondrial failure in a cell.**
The processes that are blocked by mitochondrial failure in a cell are:
- Kreb's cycle
 - Electron transport chain
 - Fatty acid metabolism
- Due to blockage of these processes production of ATP is stopped.
4. **What will happen if a chromosome loses its centromere?**
When a chromosome loses its centromere, it can not attach to the mitotic spindle and remains in the cytoplasm and this leads to the chromosomal fragmentation.
5. **How does autophagy help in converting a tadpole into an adult amphibian?**
Autophagy helps in converting a tadpole into an adult amphibian by removing tail and gills from its body during metamorphosis in the tadpole.

Chapter No: 5

No short Question from Exercise

Chapter No: 6

1. **Is there any similarity between bacterial and plant cell wall?**
Yes, following similarities are found between bacterial and plant cell wall:
- Both do not act as barriers to materials passing through it.
 - Both, cellulose found in plant cell wall and polysaccharide as a constituent of peptidoglycan present in the bacterial cell wall, are carbohydrate.
 - Both are non-living.
2. **Name general characteristics that could be used to define the prokaryotes.**
- They lack discrete chromosomes and the membrane around hereditary material or DNA, that is directly present in the cytoplasm near to the center of cell.
 - They lack membrane bound organelles.
 - They lack a cytoskeleton of microfilaments and microtubules.
 - They lack cellulose in their cell walls, instead they have polysaccharide molecules

other than cellulose that are bounded covalently to amino acid molecules forming

peptidoglycan or murein.

5. Mitosis is missing and cell divides by fission.

Note: You may write only first two or three general characteristics.

3. **Do any other microbial groups besides bacteria have prokaryotic cells?**

Yes, Cyanobacteria (Blue-green algae) have prokaryotic cells.

4. **In what habitats are bacteria found? Give some general means by which bacteria derive nutrients.**

Bacteria are found everywhere, in air, land, water, oil deposits, food, decaying organic

matter, plants, man, animals, hot springs, alkaline / acidic soil, highly saline environments, highly polluted soils and water.

Following are some general means by which bacteria derive nutrients.

I) Heterotrophic

a) Saprophytic

b) Parasitic

c) Chemoheterotrophic

d) Symbiotic

II) Autotrophic

a) Photosynthetic

b) Chemosynthetic

5. **List functions that the cell membrane performs in bacteria.**

Following functions cell membrane performs in bacteria:

a) Regulation of transport of proteins, nutrients, sugar and electrons or other metabolites.

b) Respiratory metabolism

c) Endocytosis

d) Exocytosis

e) Homeostasis

Note: You may write only first two functions.

6. **What are mesosomes and some of their possible functions?**

a) Mesosomes are invagination of cell membrane into the cytoplasm and are in the form of vesicles, tubules or lamellae.

b) Their Function is to help in DNA replication, cell division, respiration and in export of exocellular enzymes.

7. **What is unique about the structure of bacterial ribosome?**

They are smaller than eukaryotic ribosomes and are of 70 S.

8. **Draw three bacterial shapes.**

9. **Name the bacterium that has no cell wall.**

Mycoplasma is the bacterium that has no cell wall.

10. **A Gram stain discharge from an abscess shows cocci in regular, grape like clusters.**

What is the most likely genus of this bacterium?

The genus of this bacterium is *Staphylococcus*.

11. **Draw an outline and label.** i) Streptobacilli ii) Diplococci
iii) Staphylococci

i) **Streptobacilli**: -

ii) **Diplococci**: -

iii) **Staphylococci:** -

12. You observe a culture of predominantly round (presumably spherical) bacteria that though apparently fully divided, nevertheless have failed to separate, thus resulting in

long chain of cells. What, generally, might you call such an arrangement?

Such an arrangement is called Streptococci.

13. Match the following descriptions with the best answer.

- | | |
|--|--------------------|
| a) Division in one plane; cocci arranged in pairs | a) Bacilli |
| b) Division in one plane; cocci arranged in chains | b) Streptobacillus |
| c) Division in two planes; cocci arranged in a square four | c) Spirochete |
| d) Division in one plane; rods completely separate after division | d) Spirillum |
| e) Division in plane; rods arranged in chains | e) Vibrio |
| f) A comma shaped bacterium | f) Streptococcus |
| g) A thin, flexible spiral | g) Staphylococcus |
| h) A thick, rigid spiral | h) Diplococcus |
| | i) Tetrad |
| | j) Sarcina |
| a) Division in one plane; cocci arranged in pairs | h) Diplococcus |
| b) Division in one plane; cocci arranged in chain --f) | Streptococcus |
| c) Division in one plane; cocci arranged in a square of four --i) | Tetrad |
| d) Division in one plane; rods completely separate after division --a) | |
| Bacilli | |
| e) Division in one plane; rods arranged in chain --b) | Streptobacillus |
| f) A comma shaped bacterium | e) Vibrio |
| g) A thin, flexible spiral--c) | Spirochete |
| h) A thick rigid spiral--d) | Spirillum |

Chapter No: 7

1. Write two characteristics of each of the following groups:

- i) Protozoa**
- ii) Dinoflagellates**
- iii) Diatoms**
- iv) Slime Mold**
- v) Oomycetes**

i) PROTOZOA:

- a. They are unicellular organisms.
- b. Like animals, they are ingestive heterotrophs i.e. they ingest their food by endocytosis.

ii) DINOFLAGELLATES:

- a. They are mostly uni-cellular, cells are often covered with shells of interlocking cellulose plates impregnated with silicates.
- b. Cells have one posteriorly directed flagellum plus a unique transverse flagellum positioned in a girdle encircling the cell.

iii) DIATOMS: -

- a. Diatoms are unicellular golden brown algae with a unique silica cell wall that forms two overlapping shells.

creating
b. The shells of diatoms are highly ornamented with pores and spines, remarkable patterns.

iv) SLIME MOLDS:

nuclei that
a. A slime mold consists of a naked mass of cytoplasm having many
creeps over damp, decaying logs and leaf litter.
b. Slime mold, during unfavorable conditions, forms resistant spores
by meiosis within stalk sporangia.

v) OOMYCETES:

round
a) Mycelium consists of aseptate, coenocytic unbranched hyphae with
haustoria.
b) Their cell wall contains cellulose.

Chapter No: 8

1. What is hypha? What is the advantage of having incomplete septa?

Hypha (pl.hyphae) is a microscopic slender branched tube or filament of cytoplasm bounded by cell walls made of chitin and may or may not have septa. Incomplete septa allow the mixing of cytoplasm from cell to cell, carrying the minerals to growing tips and enabling the hyphae to grow more rapidly when food and water are abundant and temperature is favorable.

2. What is the composition of fungal cell wall and how is this composition is advantageous to fungi?

The cell wall of fungus lacks cellulose and has chitin. Chitin gives the cell wall rigidity and strength and is resistant to decay than cellulose and lignin which make up the plant cell wall.

3. To which phyla do the yeasts belong? How they differ from other fungi?

Yeasts belong to three phyla of fungi i.e. Ascomycota, Basidiomycota and Deuteromycota but majority of yeasts belong to phylum Ascomycota. They differ from other fungi being unicellular and non-hyphal.

4. Name sexual and asexual spores of Ascomycetes.

Ascospores are sexual spores while conidia are asexual spores of Ascomycetes.

5. What are mycorrhizae?

Mutualistic associations between roots and fungi are called mycorrhizae, literally meaning "fungus roots". Mycorrhizal fungi are associated with 95 % of all kinds of land plants.

6. By what means can individuals in imperfect fungi be classified?

The individuals in imperfect fungi can be classified on the basis of DNA sequences.

7. Give a single characteristic that differentiates Zygomycota from Basidiomycota.

Zygomycota have coenocytic hyphae, which have no septa, while Basidiomycota have septate hyphae.

8. Why is green mold more likely to contaminate an orange kept in a refrigerator than are bacteria?

Green molds are more likely to contaminate an orange kept in a refrigerator than bacteria because they can grow at lower temperatures such as the 5°C found in the normal refrigerator.

9. What is fungus?

A fungus is usually a filamentous, multi-cellular or multinucleate, spore-bearing, eukaryotic, absorptive heterotroph, usually a saprobe, having cell wall made up of chitin.

10. State two parallel characteristics of Ascomycetes and Basidiomycetes.

1. Both have septate hyphae.
2. Both have lengthy dikaryotic phase in their life cycle.

Chapter No: 9

1. How are ferns better adapted to life on land than liverworts and mosses?

Ferns are adapted to life on land than liverworts and mosses because they have well developed vascular system with true roots, stems and leaves.

2. Which of the followings is nutritionally self supporting?

1. Mature liverwort and moss gametophyte.

2. Mature liverwort and moss sporophyte.

Following are nutritionally self supporting.

2. Mature liverwort and moss sporophyte.

3. The chances of survival and development of wind-blown pollen grains are much less

than those of spores of *Adiantum*. Comment on this statement.

1. Wind blown pollen grains may fall on the ground instead of stigma of carpel.

2. Spores of *Adiantum* are usually shed near or around the sporophyte on moist soil and are more likely germinated.

4. Account for the fact that megaspores are large while microspores are small.

Mega-spores contain large amount of food for the development of zygote and then embryo.

5. What important advances have angiosperms made towards the seed plant life?

Many advances angiosperms have made towards the seed plant life. Some are:

1. Development of ovules and seeds.
2. Development of ovary into fruit.
3. Development of flower.

6. Write a note on alternation of generation.

A) Definition: -

It is the phenomenon in the life cycle of many plants in which haploid gametophyte and diploid sporophyte regularly alternate with each other.

Or

The phenomenon of alternation of gametophyte and sporophyte in the life history of a plant is called alternation of generation.

B) Explanation:

Alternation of generation occurs in both vascular and non-vascular plants.

I) Alternation of generation in Bryophytes, Non-Vascular plants

Alternation of generation occurs in the life history of liverworts, mosses and hornworts (i.e. Bryophytes) which have two distinct gametophyte and sporophyte generations that regularly alternate with each other.

a) Gametophyte Generation:

- i) It is haploid generation.
- ii) It is dominant generation because it is more conspicuous.
- iii) It is free living, independent photosynthetic generation.
- iv) It has both male and female plants.
- v) Male gametophyte has male sex organs, the antheridia, which produce haploid male gametes, the antherozoids, by mitosis.
- vi) Female gametophyte has female sex organ, the archegonia, which produce haploid female gametes, the oospheres, by mitosis.
- vi) Male gamete fertilizes a female gamete to produce diploid oospore that produces totally a different plant, the sporophyte.
- vii) Gametophyte generation itself is produced by the germination of spores produced by sporophyte generation.
- viii) It begins with spores and ends at gametes.

b) Sporophyte Generation:

- i) It is diploid generation.
- ii) It is a less conspicuous generation.
- iii) It is non-photosynthetic, partially or totally dependent upon the gametophyte for its nutrition.
- iv) It is usually differentiated into foot, seta and capsule (also called sporangium).
- v) Haploid spores are produced within capsule by meiosis.
- vi) Spores on germination do not develop into sporophytes but give rise male or female gametophyte plants.
- vii) It begins with oospore and ends at spore mother cell.

7. What is the importance of the following?

- i) Seed
- ii) Double Fertilization
- iii) Heterospory
- i) Seed: -.

1. It protects embryo enclosed in it from unfavorable conditions and is a mean for germination of embryo far from its parent plants.
2. It supplies the food to geminating embryo.

ii) Double fertilization:
 It ensures the production of diploid zygote and triploid endosperm. Zygote changes into embryo, while endosperm provides food for the development of embryo and sometimes for the germination of seed.

iii) Heterospory: -
 Production of different types of spores in heterospory leads to the variations in the next gametopytic generation. It is also an important evolutionary step towards seed formation.

8. Sketch and label a fertile pinnule and sporangium of *Adiantum*.
Chapter No: 10

No short Question from Exercise

Chapter No: 11

- 1. List four features of a leaf which show that it is able to carry out photosynthesis.**
 1. Flatness and expansion of lamina or leaf blade for maximum light absorption
 2. Arrangement of mesophyll tissues for carrying out of photosynthesis
 3. Presence of stomata for entry of CO₂
 4. Highly vascularized vascular bundles for supply of water
- 2. How does light affect opening of stomata?**
 Light affects opening of stomata in the following two ways:
 1. In the presence of light chlorophyll containing guard cells synthesize sugar which in turn increase the osmotic potential of guard cells.This increase results in endosmosis and ultimately to turgidity. When guard cells become turgid their inner walls bend outward at the centre producing opening called stoma.
 2. Sunlight acidifies the environment of the guard cells (i.e.pumps out protons) which enables the guard cells to take up K⁺, water follows by osmosis , guard cells swell with water and stoma opens.
- 3. What causes the variations of osmotic potential in the guard cells?**
 Use and disuse of water in the presence and absence of photosynthesis cause the variations of osmotic potential in the guard cells.
- 4. What is the difference between an action spectrum and an absorption spectrum?**

| Action spectrum | Absorption spectrum |
|------------------------------------|--|
| 1. It is the graph showing rate of | 1. It is the graph showing wave lengths of light |

| | |
|--|--|
| <p>photosynthesis at each wavelength that is plotted by estimating relative CO₂ consumption or oxygen release during photosynthesis.</p> <p>2. It does not parallel the absorption spectrum of chlorophyll exactly. It is more than absorption of different wave lengths due to presence of accessory pigments.</p> <p>3 Peaks are broader.</p> <p>4. Valley is not deep.</p> | <p>absorbed by a pigment.</p> <p>2. The sum of the absorption spectra corresponds to the action spectrum of photosynthesis.</p> <p>3. Peaks of wave lengths absorbed are narrower.</p> <p>4. Valley is deep.</p> |
|--|--|

5. **What is the role of accessory pigments in light absorption?**

Accessory pigments absorb the sunlight and transfer to chlorophyll a. Carotenoids and chlorophyll b are accessory pigments. The order of transfer of energy is: Carotenoid-->Chlorophyll b->Chlorophyll a
Some carotenoids protect chlorophyll from intense light by absorbing and dissipating excessive light energy, rather than transferring energy to chlorophyll.

6. **Explain the difference between the cyclic and non-cyclic photo-phosphrylation with the help of Z scheme.**

1. **Non-Cyclic Photoposhorylation**

- 1. It is linear flow of electron from water to NADP+ and involves both PS I and PS II.
- 2. ATPs, NADPH and Oxygen is produced.
- 3. Electrons pass on to a terminal acceptor NADP+ and never come back to initial source.

2. **Cyclic Photoposphorylation**

- 1. It is cyclic flow of electron from PS I, primary acceptor, ferredoxin and cytochrome complex back to PS I.
- 2. Only ATPs are produced.
- 3. Electrons are cycled from ferredoxin back to cytochrome complex.

7. **What is the net production of ATP during glycolysis?**

The net production of ATP during glycolysis is 2 molecules.

8. **What is the difference between the photo-phosphorylation and oxidative**

phosphorylation?

| Photo Phosphorylation | Oxidative Phosphorylation |
|--|--|
| It refers to a series of changes in which sun light energy absorbed by photosynthetic pigments lysis water molecules removing pairs of electrons which are passed from one substance to another and energy released is used to form ATP. | It refers to a series of changes in which pairs of electrons are passed from one substance to another and ultimately to oxygen and the energy released during the passage is used to combine ADP molecules with phosphate molecules to form ATP. |

9. What is the location of ETC and chemiosmosis in photosynthesis and cellular respiration?

The location of ETC and chemiosmosis in photosynthesis is thylakoid membrane, while in cellular respiration is mitochondrial membrane.

10. How did the evolution of photosynthesis affect the metabolic pathway?

First photosynthetic organisms used hydrogen sulfide as a source of hydrogen for reducing carbon dioxide to sugars releasing sulfur in the atmosphere. Later water was evolved as a source of hydrogen for the same purpose releasing oxygen in the atmosphere. Accumulation of free oxygen in the atmosphere caused the evolution of use of oxygen by a series of metabolic pathways e.g. aerobic respiration.

11. How does absorption spectrum of chlorophyll a differ from that of chlorophyll b?

Absorption spectrum of chlorophyll a differs from that of chlorophyll b because chlorophyll a is slightly different in structure from chlorophyll b, due to which some wave lengths not absorbed by chlorophyll “a” are very affectively absorbed by chlorophyll “b” and vice versa. Chlorophyll a is blue-green, whereas Chlorophyll “b” is yellow green.

12. Why are the carotenoids usually not obvious in the leaves? They can be seen in the leaves before leaf fall. Why?

Carotenoids are yellow pigments which are often masked by darker green color of chlorophylls. So they are usually not obvious in the leaves. Carotenoids can be seen in the leaves before leaf fall because dominant green chlorophyll pigments are destroyed before leaf fall at the end of growing season.

- 13. How the formation of vitamin "A" is linked with eating of carrot?**
The formation of vitamin A is linked with eating of carrot because it contains carotenoids, the precursor of vitamin A which are changed into vitamin A by a chemical reaction.

Chapter No: 12

No short Question from Exercise

Chapter No: 13

- 1. How does breathing differ from respiration?**
Breathing is simply exchange of gases between environment and the respiratory structures (lungs or gills) via air or water. Respiration is the oxidation of food to release energy and includes all those steps that help to supply oxygen to cells for oxidation of food and removal of carbon dioxide from the body. Breathing is the sub-step of respiration in higher animals.
- 2. How much carbon dioxide is present in venous and arterial blood?**
About 54 ml and 50 ml of CO₂ per 100 ml of blood is present in venous and arterial blood respectively.
- 3. How does air always remain in the lungs of human beings?**
About 1.5 liters air always remains in the lungs of human beings.
- 4. What are the products which are produced during photorespiration?**
The final products which are produced during photorespiration are serine and carbon dioxide. The intermediate products are glycolate and glycine.
- 5. How much a water medium is denser than air for exchange of respiratory gases?**
A water medium is 50 times denser than air for exchange of respiratory gases.

Chapter No: 14

No short Question from Exercise

Short Questions

From

Multan, and other Boards of Secondary and Higher Secondary Education of Punjab

Chapter No: 1 2 SQs Multan Board

Questions

- 1. Differentiate between Theory and Law. (Multan Board-1st Annual 2007)
- 2. Differentiate between Deductive Reasoning and Inductive Reasoning. (Model Paper of Multan Board-2006-2008)
- 3. What is Hydroponic Culture Technique? (Multan Board-1st Annual 2008)
- 4. Define Population and give its two attributes. (Multan Board-2nd Annual 2008)
- 5. Define Vaccination. (Multan Board-1st Annual 2009)
- 6. What are Biopesticides? (Multan Board-2009)
- 7. What is Integrated Disease Management? (Multan Board-1st Annual 2009)
- 8. Define Theory and Scientific Law. (Multan Board-2nd Annual 2009)
- 9. Differentiate between Deductive Reasoning and Inductive Reasoning. (Multan Board-1st Annual 2010)
- 10. What are Bioelements? (Multan Board-1st Annual 2010)
- 11. What is Hydroponic Culture Technique? What is its use? (S or 2nd Annual-2010)
- 12. Define Zoogeography and Parasitology. (S-2010)
- 13. Define Bioremediation. Give example. (A or 1st Annual-2011)
- 14. Differentiate organ-system formation between Plants and Animals. (A-2011)
- 15. Differentiate between Deductive and Inductive Reasoning. (S-2011)
- 16. What are the disadvantages of Pesticides? (S-2011)
- 17. Differentiate between Organ and Organelle. (A-2012)
- 18. Differentiate between Chemo Therapy and Gene Therapy. (A-2012)
- 19. What is Phyletic Lineage? (A-2013-New)
- 20. Define Population. (A-2013-Old)
- 21. Differentiate between Community and Population. (A-2013-New)

Answers

1. Differences between Theory and Law:

| Theory | Law |
|---|---|
| 1. It is a series of hypotheses supported by results of many tests. | 1. It is a theory which proved to be true under all tested circumstances. |
| 2. It may suggest new and different hypotheses. | 2. It is a virtually irrefutable theory. |
| 3) It may change into law. | 3. It is uniform and constant fact of nature which can not be changed. |
| 4. It is more specific than law. | 4. It is more general than theory. |
| 5. It gives answers of simple questions. | 5. It can afford answers to even more complex questions. |

2. Diffeneces between Deductive Resoning and Inductive Reasoning:

| Deductive Reasoning | Inductive Reasoning |
|--|---|
| 1. It moves from general to specific. | 1. It moves from specific to general. |
| 2. It involves drawing specific conclusion from some general | 2. It begins with specific observation and leads to the |

| | |
|--|---|
| principle/assumption. Example:- If all birds have wings and sparrows are birds, then we conclude that sparrows have wings. | formation of general principle. Example: If sparrows have wings and are birds and eagle, parrot, hawk and crow are birds, then we conclude that all birds have wings. |
|--|---|

3. **Hydroponic Culture Technique:**

1. It is the science of growing terrestrial plants in an aerated solution.
 2. Nutrient mineral salts are added in the aerated water.
 3. It is used to test whether certain nutrient is essential or not.
 4. Hydroponic forming is not feasible.
 5. Astronauts used it for growing vegetables.
- Or
- It is the technique in which plants are grown in aerated water to which mineral salts are added in order to test whether certain mineral is essential or not.

4. **Population and its two attributes: -**

Population is a group of living organisms of the same species located in the same place at the same time.

Or

Members of one species inhabiting the same area are collectively called population.

- Examples:**
1. The number of students in a class room
 2. The number of rats in the field of rice.

The two attributes of population are: a) Gene frequency b) Gene flow

5. **Vaccination: -**

Vaccination is the inoculation of human body with inactive or weakened pathogens or pathogenic products called vaccine in order to stimulate active acquired immunity.

Or

It is inoculation of inactive or weakened bacteria or viruses or their toxins so as to stimulate the production of antibodies or lymphocytes.

Bio-pesticides are the living organisms which are used to kill the pests.

Example: Some bacteria act as bio-pesticides.

7. **Integrated Disease Management: -**

It is the control of various diseases by utilizing all the relevant methods with the education and participation of community.

Or

1. It is effective control of a particular disastrous disease or all the common diseases of a plant or control of dangerous diseases from human society.
2. In this programme all methods as and when required are utilized.
3. It requires awareness of the community about the severity of the problem, its causes and its remedies.

8. **A) Theory: -**

A theory is a set statement which is found to be true as a result of testing of many

hypotheses.

Example: Darwin's Theory of Natural Selection

B) Scientific Law:

Scientific Law is virtually an irrefutable theory that is proved to be true under all

tested circumstances. It is a uniform or constant fact of nature.

Example: Mendel's Law of Inheritance, Hardy Weinberg Law

9. Differences between Deductive Reasoning and Inductive Reasoning: -
See Multan Board Answer No: 2

10. A) Bioelements:

The elements occurring in the living organisms which have special properties making

them suitable as basis for life are called Bio-elements. Or

The elements that form the chemical compounds from which living organisms are

made are called Bio-elements.

B) Examples: -

a) Major Bioelements: Oxygen, Carbon, Hydrogen, Nitrogen, Calcium and

b) Minor Bioelements: Phosphorous, Potassium, Sulphur, Chlorine, Sodium, Magnesium and

c) Trace Bioelements: Iron, Copper, Maganese, Zinc and Iodine

11. A) Hydroponic Culture Technique:

It is the technique in which plants are grown in aerated water to which mineral

salts are added in order to test whether certain mineral is essential or not.

B) Use of Hydroponic Culture Technique:

1. It is used to test whether certain nutrient is essential or not
2. Astronauts used it for growing vegetables.

12. A) Zoogeography:

It is the study of **the distribution of the animals in different regions of earth.**

B) Parasitology:

It deals with the study of parasites, their life cycles, structures, modes of transmission and interaction with their hosts.

13. Bioremediation:-

It is the removal or degradation of environmental pollutants or toxic materials by living

organisms.

Example: Algae reduce pollution of heavy metals by re-absorption.

14. Differences between organ-system formation in Plants and Animals:

| Organ System in Plants | Organ System in Animals |
|--|---|
| <ol style="list-style-type: none">1. It is much less definite than animals.2. Plants have some organs such as roots, stems, leaves etc. and clear cut functions are assigned to these structures. | <ol style="list-style-type: none">1. It is more complex than plants.2. Animals have many organs and organ sytems and their complexity is associated with a far greater range of functions and acitivities found in them. |

15. Diffeneces between Deductive Resoning and Inductive Reasoning: -
See Multan Board Answer No: 2

16. Disadvantages of Pesticides: -
1. Use of pesticides poses toxicity problems for human being.
2. They cause environmental pollution.
3. Insects become resistant due to the effect of pesticides.

17. Differences between organ and organelle:

| Organ | Organelle |
|---|--|
| 1. It is the structure of an organism that is specialized to perform a particular function. | 1. It is the structure within the cell that performs a specific function. |
| 2. It is normally composed of several tissue types. | 2. It is a sub-cellular structure. |
| 3. The arrangement of organs speaks of division of labour in the organism. | 3. The arrangement of organelles speaks of division of labour within the cell. |
| Example: Heart | Example: Mitochondrion |

18. Differences between Chemo Therapy and Gene Therapy:

| Chemo-therapy | Radio-therapy |
|---|---|
| 1. It is the treatment by chemicals i.e. drugs. | 1. It is the treatment by short wave radiations. |
| 2. It is used for the destruction of pathogens and cancerous cells. | 2. It is used for the treatment of various tumors especially malignant tumors i.e. cancerous cells. |

19. Phyletic Lineage:
Phyletic lineage is an unbroken series of species arranged in ancestor to descendant sequence with rest of the groups evolved from one that immediately preceded it. Or
A phyletic lineage is an unbroken series of species arranged in ancestor to descendent sequence with each later species having evolved from that immediately preceeded it.
Phyletic lineages had led to evolving populations of the organisms living in the remote past.

20. Population: -
See Multan Board Answer No: 4

21. Differences Between Community and Population: -
See Bahawalpur Board Answer No: 6

Bahawalpur Board
Questions

1. What is cloning? (Bahawalpur Board-2007)
2. Define inductive reasoning. (Bahawalpur Board-2007)
3. What is Vaccination? (Bahawalpur Board-2008)
4. Gives names of six Bio-elements which make up 99% of the total human body mass.
(Bahawalpur Board-2009)
5. What do you mean by Biological Control? Give examples. (Bahawalpur Board-2009)
6. Differentiate between Population and Community. (Bahawalpur Board-2010)
7. What is Hydroponic Culture Technique? (A-2010)
8. Differentiate between Population and Community. (A-2011)
9. Why is there need to control Environmental Pollution? (A-2011)
10. What is Gene Therapy? (A-2012)
11. What is Biological Control? (A-2012)
12. How is Law different from Theory? (A-2013)
13. What are six bioelements by which 99 % part of human body is formed of? (A-2013)

Answers

1. **Cloning:** -

Cloning is the production of duplicate copies of genetic material (DNA), cells or entire multi-cellular organism, all derived from a common ancestor. Or Cloning is production of genetically identical copies of organisms/cells by asexual production.

2. **Inductive reasoning:**

It is generalizing from specific cases to arrive at broad principles. Or It is involved in collecting isolated facts to reach a general idea that explains a phenomenon.

Example:

1. Sparrows have wings and are birds.
2. Eagle, parrot, hawk and crow are birds.

From the above facts following hypothesis can be made through Inductive Reasoning:

All birds have wings.

3. **Vaccination:**

Vaccination is the inoculation of vaccine in order to make the people or animals immune.

Edward Jenner first developed the technique of vaccination in 1796. It is either carried out at the time of viral or bacterial epidemics or early in the life to make the people and animal immune to these diseases.

4. **Six Bio-elements making up 99% of the Total Human Body Mass:**

Following six Bio-elements make up 99% of the total human body mass. Oxygen 65 %,

5. **Biological Control:** -

Control of organisms by some other living organisms is called biological control. Organisms used as biological control, compete with them or even eat up them.

Examples:

1. An aphid that attacks a walnut tree, is being controlled biologically by a wasp that parasitizes this aphid.
2. Some bacteria (also called bio-pesticides) are being used to kill pests.

6. **Differences between Population and Community:** -

| Population | Community |
|---|--|
| 1. It is the group of organisms of one species inhabiting the same area at the same time.. 2. It is a lower level of biological organization than community. | 1. It is the group of organisms of two or more species inhabiting the same area at hre same time. 2. It is a higher level of biological organization than population. It includes more than one population. |
| Examples:- a) The number of rats in a field of rice. b) Human population in a city. | Example:- Birds, rats and other animals in the field of rice. |

7. **Hydroponic Culture Technique:**
See Multan Board Answer No: 3
8. **Differences Between Community and Population: -**
See Bahawalpur Board Answer No: 6
9. **Need to control Environmental Pollution: -**
There is need to control Environmental Pollution or else it would soon be out of control
in which case the biocomponents of the world ecosystem would suffer irreparable loss
and this environment would no longer support life on this planet.
10. **Gene Therapy: -**
It is a new technique in which defective genes are repaired. Normal genes are first isolated and then they are inserted in to the patient through bone marrow.
Or
It is the insertion of genetic material into the human cells for the treatment of a disorder.
11. **Biological Control: -**
See Bahawalpur Board Answer No: 5
12. **Law different from Theory: -**
See Multan Board Answer No: 1
13. **Six Bioelements by which 99 % part of Human Body is formed of: -**
See Bahawalpur Board Answer No: 4

Dera Ghazi Khan Board
Questions

1. What is Pasteurization? (Dera Ghazi Khan Board-2008)
2. What do you mean by Vaccination? (Dera Ghazi Khan Board-2009)
3. How does law differ from theory? (Dera Ghazi Khan Board-2009)
4. Give the names and percentage of six bio-elements that form 90% part of the human body.
(Dera Ghazi Khan Board-2010)

5. What is bioremediation? (Dera Ghazi Khan Board-2010)
6. Define Biotechnology. (A-2011)
7. What is Biome? (A-2011)
8. What are Bio-elements? Name Bio-elements which occur in traces in human body (A-2012)
9. How does theory differ from law? (A-2012)
10. Define Immunization and Vaccination. (A-2012)
11. What is difference between population and community? (A-2013)
12. What is radiotherapy and chemotherapy? (A-2013)

Answers

1. Pasteurization:

Pasturization is a heating process that destroys bacteria in a fluid and lowers the overall number of bacteria in the fluid. It is being widely used for preservation of milk and milk products.

2. Vaccination: -

See Multan Board Answer No: 5 and Bahawalpur Answer No: 3

3. Law different from Theory: -

See Multan Board Answer No: 1

4. Names and Percentage of Six Bio-elements that form 90% part of the Human Body: -

See Bahawalpur Answer No: 4

5. Bioremediation: -

See Multan Board Answer No: 13

6. Biotechnology: -

It deals with the use of living organisms for the study and solution of problems concerning

living organism particularly human beings. Or

It deals with the use of living organisms, systems or processes in manufacturing and service industries.

Example: Insulin is commercially produced by introducing its gene in bacteria.

7. Biome: -

It is a large regional community primarily determined by climate and has been named

after the type of major plants or major feature of the ecosystem.

Examples: Desert, Tropical Rain Forests etc.

8. A) Bio-elements:

See Multan Board Answer No: 10

B) Names of Trace Elements: -

Following are the bio-elements which occur in traces in human body:
Copper, Maganese, Zinc and Iodine

9. Law different from Theory:

See Multan Board Answer No: 1

10. A) Immunization: It is artificially induced active as well as passive immunity. Both

vaccines and antisera are inoculated for Immunization.

B) Vaccination: -It is artificially induced passive immunity. It is a part of immunization. Only vaccines are inoculated for vaccination

11. Differences Between Population and Community: -
See Bahawalpur Board Answer No: 6

12. A) Radiotherapy: -
1. It is the treatment by short wave radiations.
2. It is used for the treatment of various tumors especially malignant tumors i.e. cancerous cells.

B) Chemotherapy: -
1. It is the treatment by chemicals i. e. drugs.
2. It is used for the destruction of pathogens and cancerous cells. In case of cancer, certain anticancer chemicals are administered to the patient at regular intervals.

Lahore Board Questions

1. What is hydroponic culture technique? (Lahore Board-2006)
2. What is biological control? (Lahore Board-2007)
3. What is community? (Lahore Board-2007)
4. What do you mean by integrated disease management? (Lahore Board-2008)
5. What is biotechnology? (Lahore Board-2008 and 2009)
6. Compare between organelle and organ. (Lahore board-2009)
7. What is theory? (Lahore Board-2009)
8. Differentiate between gene therapy and chemo-therapy. (Lahore Board-2010)
9. What is hydroponic culture technique? (Lahore Board-2010)
10. Define Bio-elements. Name Bio-elements which occur in traces in human body (A-2011)
11. Differentiate between population and community. (A-2011)
12. How and when a hypothesis becomes a theory? (A-2012)
13. What is hydroponic culture technique? Give its uses. (A-2012)
14. Differentiate between chemotherapy and genetherapy. (Group I-A-2013)
15. Differentiate between population and community. (Group I -A-2013)
16. Define biosphere. (Group II-A-2013)
17. Define chemotherapy. Mention its disadvantages. (Group II-A-2013)

Answers

1. Hydroponic Culture Technique:
See Multan Board Answer No: 3

2. Biological Control:
See Bahawalpur Board Answer No: 5

3. Community:
A community is a group of organisms of different species living in a particular area. Or
Populations of several species living and interacting in the same area form a community.

4. Integrated Disease Management:
See Multan Board Answer No: 7

5. **Biotechnology: -**
See Dera Ghazi Khan Board Answer No: 6

6. **Comparison of Organelle and Organ:**
See Multan Board Answer No: 17

7. **Theory:**
A theory is a set statement which is found to be true as a result of testing of many hypotheses. A good theory called Productive has following characteristics:
 1. It has explanatory power.
 2. It is predictive.
 3. It may suggest new and different hypotheses.

8. **Differences between Genetherapy and Chemotherapy: -**

| Genetherapy | Chemotherapy |
|---|---|
| 1. It is a new technique of isolation and then insertion of normal gene through bone marrow into the patient with defective gene. | 1. It is the treatment by chemicals i.e. drugs. |
| 2. It is used for the treatment of Defective gene. | 2. It is used for the destruction of pathogens and cancerous cells. |

9. **Hydroponic Culture Technique:**
See Multan Board Answer No: 3

10. **Bio-elements and Names of Trace Elements: -**
See Dera Ghazi Khan Board Answer No: 8

11. **Differences Between Population and Community: -**
See Bahawalpur Board Answer No: 6

12. **How and when a Hypothesis becomes a Theory: -**
A hypothesis becomes a theory when it is tested again and again without ever being falsified and is considered well supported and generally accepted. This may be used the basis of formulating further hypothesis. So there is soon a series of hypotheses supported by the result of many tests which is then called a theory.

13. **Hydroponic Culture Technique and its Use: -**
See Multan Board Answer No: 11

14. **Differences between Chemotherapy and Genetherapy: -**
See Lahore Board Answer No: 8

15. **Differentiate between Population and Community: -**
See Bahawalpur Board Answer No: 6

16. **Biosphere: -**
Biosphere is the zone of air, land, and water at the surface of the earth in which living organisms are found. Or

It is the part of earth inhabited by living organisms which includes both living and the non-living components.

17. A) Chemotherapy: -

Chemotherapy consists of administering certain anticancer chemicals to the patient at regular intervals.

B) Disadvantages of Chemotherapy: -

Chemotherapy may also kill normal cells.

Gujranwala Board Questions

1. What is gene-therapy? (Gujranawala Board-2005)
2. Differentiate between Deductive Reasoning and Inductive Reasoning. (Gujranawala Board-2007)
3. Write a short note on cloning. (Gujranawala Board-2007)
4. Write a short note on cloning. (Gujranawala Board-2008)
5. Differentiate between community and ecosystem. (Gujranawala Board-2009)
6. Give four characteristics of living organisms. (Gujranawala Board-2009)
7. Differentiate between bioremediation and biological control. (Gujranawala Board-2010)
8. Compare deductive reasoning and inductive reasoning. (A-2010)
9. Define deductive reasoning. (A-2011)
10. What is hydroponic culture technique? (A-2011)
11. What are bio-elements? Give their proportion in human body. (A-2012)
12. What do you know about Gene Therapy? (A-2012)
13. What do you know about bioremediation? (A2013)
14. Differentite between inductive and deductive resoning. (A-2013)

Answers

1. Gene-therapy: -

See Bahawalpur Board Answer No: 10

2. Differences between Deductive Reasoning and Inductive Reasoning: -

See Multan Board Answer No: 2

3. Note on Cloning:

1. Cloning is the production of duplicate copies of genetic material (DNA), cellssor
entire multi-cellular organism, all derived from a common ancestor. Or
Cloning is the production of genetically identical copies of organisms/cells
by
asexual reproduction.
2. Cloning is the technology for achieving eugenic aims.
3. Several insects, many plants reproduce naturally by cloning in some
circumstances whereas few do so regularly.
4. Artificial cloning is done either by replacement of nucleus of zygote by
another
nucleus of the
same organism or by separation of cells of embryo to form more embryos.
5. In 1977 scientists in Scotland succeeded in cloning a sheep. Since then
Cloning of
mice, cows, cattle, horses and other farm animals have been done.

4. Short Note on Cloning: -

5. **Difference between Community and Ecosystem: -**

| Community | Ecosystem |
|--|---|
| 1. It is the collection of organisms of more than one species in the same area at the same time. | 1. It is the interaction of organisms of more than one species with their environment. |
| 2. In community only organisms are studied. | 2. In ecosystem organisms as well as their non-living surrounding or habitat are studied. |

6. **Four Characteristics of Living Organisms: -**

1. They are made up of one or more cells.
2. They contain genetic program of their characteristics.
3. They can acquire and use energy.
4. They can carry out and control numerous chemical reactions.

7. **Differences between Bioremediation and Biological Control:**

| Bioremediation | Biologica Control |
|---|--|
| 1. It is the removal or degradation of non-lining material by living organisms. Example: Removal of heavy metals by Algae | 1. It is the control of living organisms by other living organisms. Example: Control of Aphids by wasp |

8. **Comparison of Deductive Reasoning and Inductive Reasoning: -**
See Multan Board Answer No: 2

9. **A) Deductive Reasoning: -**

It is analyzing specific cases on the basis of general principles.
It is involved in drawing conclusion from some general principle / assumptions.

B) Example:
1. All birds have wings.
2. Sparrows are birds.
From the above facts following hypothesis can be made through Deductive Reasoning:
Sparrows are birds.

10. **Hydroponic Culture Technique:**
See Multan Board Answer No: 3

11. **A) Bioelements:**

See Multan Board Answer No: 10

B) Proportions of Bioelements:

a) Major Bioelements: Oxygen 65 %, Carbon 18 %, Hydrogen 10 %, Nitrogen 3 %, Calcium 2 % and Phosphorous 1 %
b) Minor Bioelements: Potassium 0.35 %, Sulphur 0.15 %, Chlorine 0.15 %, Sodium 0.15, Magnesium 0.05 % and Iron 0.004 %

c) **Trace Bioelements:** Copper, Maganese, Zinc and Iodine, all in traces

- 12. **Gene Therapy:**
See Bahawalpur Board Answer No: 10
- 13. **Bioremediation: -**
See Multan Board Answer No: 13
- 14. **Differences between Deductive and Inductive Reasonings:-**
See Multan Board Answer No: 2

Rawalpindi Board

Questions

- 1. How does AIDS spread? (Rawalpindi Board-2010)
- 2. Differentiate between Population and Community. (Rawalpindi Board-2010)
- 3. Define biotechnology and microbiology. (A-2011)
- 4. What important biological work was done in 1997? (A-2011)
- 5. What is gene therapy? (A-2012)
- 6. How marine biology differs from fresh water biology? (A-2012)
- 7. Describe briefly hydroponic culture technique. (A-2013)
- 8. Define biological control with an example. (A-2013)

Answers

- 1. **Spread of AIDS: -**
AIDS, caused by HIV, spreads through free sexual contact, through blood transfusion, by using contaminated or surgical instruments etc.
- 2. **Differences between Population and Community:**
See Bahawalpur Board Answer No: 6
- 3. **Biotechnology:** It deals with the use of living organisms, systems or processes in manufacturing and service industries.
Microbiology: It deals with the study of Microorganisms. (e.g, Bacteria, Viruses, Protozoa, MicroscopicAlgae and Fungi)
- 4. **Important Biological Work done in 1977:**
In 1997 scientists in Scotland succeeded in cloning a sheep named Dolly from a somatic cell.
- 5. **Gene Therapy:**
See Bahawalpur Board Answer No: 10

- 6. **Differences between Freshwater Bioloy and Marine Biology:**

| Fresh Water Biology | Marine Biology |
|---|--|
| It dels with physical and chemical characteristics of freshwater bodies (i.e. salt free water) and life dwelling in These fresh water bodies. | It deals with the physical and chemical characteristics of sea and oceans (i.e. marine water) and life inhabiting the sea and ocean. |

7. **Hydroponic Culture Technique: -**
See Multan Board Answer No: 3
8. **Biological Control with an example: -**
See Bahawalpur Board Answer No: 5

Sargodha Board Questions

1. Define theory and scientific law. (Sargodha Board-2010)
2. Differentiate between Deductive Reasoning and Inductive Reasoning. (Sargodha Board-2010)
3. Define Bioelements. Name SIX bioelements that account for 99 % of the total mass in the human body. (A-2011)
4. What does mean by Phyletic Lineage? (A-2011)
5. What is Hydroponic Culture Technique? (A-2013)
6. What do you know about Radiotherapy and Chemotherapy? (A-2013)

Answers

1. **Theory and Scientific Law: -**
See Multan Board Answer No:8
2. **Differences between Deductive Reasoning and Inductive Reasoning: -**
See Multan Board Answer No: 2
3. **A) Bioelements:**
See Multan Board Answer No: 10
B) Six Bioelements:
Six Bio-elements that make up 99% of the total human body mass are
Oxygen 65 %, Carbon 18 %, Hydrogen 10 %, Nitrogen 3 %, Calcium 2 % and Phosphorous 1 %
4. **Phyletic lineage:**
See Multan Board Answer No: 19
5. **Hydroponic Culture Technique: -**
See Multan Board Answer No: 3
6. **Radiotherapy and Chemotherapy: -**
See Dera Ghazi Khan Board Answer No: 12

Faislabad Board Questions

1. What do you mean by community? (Faislabad Board-2007)
2. What is Biome? (Faislabad Board-2007)
3. What are Bioelements? Give their features. (Faislabad Board-2008)
4. Define Cloning. Write its two advantages. (Faislabad Board-2009)
5. Differentiate between Gene Therapy and Chemo Therapy. (Faislabad Board-2009)
6. What are endangered species? Give an example. (Faislabad Board-2010)
7. What is bioremediation? (Faislabad Board-2010)
8. How does AIDS spread? (Rawalpindi Board-2010)

9. What is meant by integrated disease management? (A-2011)
10. Compare theory with law. (A-2011)
11. What is biome? Give example. (A-2012)
12. Differentiate between micromolecules and macromolecules. (A-2012)
13. Define biotechnology. (A-2013)
14. What is hydroponic culture technique? Give its use. (A-2013)

Answers

1. **Community:**

1. Community is the populations of different species (plant and animals) living in the same habitat.
2. Community may be complex or simple.
3. Complex communities are well interrelated.
4. Any change in the simple community can have drastic and long lasting effects.
5. In a community one population may increase and others may decrease due to fluctuations in abiotic factors.

2. **Biome:**

See Dera Ghazi Khan Board Answer No: 7

3. **A) Bioelements:**

See Multan Board Answer No: 10

B) Features of Bioelements:

1. Their properties are different from the elements of non-living world.
2. They have special properties which make them particularly suitable as basis for life.

4. **A) Cloning:**

See Bahawalpur Board Answer No: 1

B) Advantages of cloning: -

- i. To achieve eugenic aims
- ii. For commercial production of valuable animals of known pedigree.

5. **Differences between Gene Therapy and Chemo Therapy: -**

See Lahore Board Answer No: 8

6. **A) Endangered Species:**

The animal and plant species that have become extinct are called Endangered Species.

B) Examples:

In Pakistan Asian Lion, Indian Rhino etc. are listed in Endangered Species. More than 500 species of plants have been declared Endangered Species.

7. **Bioremediation:**

See Multan Board Answer No: 13

8. **Spread of AIDS:**

See Rawalpindi Board Answer No: 1

9. **Integrated Disease Management:**

See Multan Board Answer No: 7

10. **Comparison of Theory and Law: -**

See Multan Board Answer No: 1

11. **Biome with example:**
See Faislabad Board Answer N: 2
12. **Differences between Microand MacroMolecule: -**
Micro-molecules have low molecular weights, while macro-molecules have high molecular weights.
Examples: -
Micromolecules -CO₂, H₂O etc.
Macromolecules Starch, Cellulose etc.
13. **Biotechnology: -**
See Dera Ghazi Khan Board Answer No: 6
14. **Hydroponic Culture Technique and its Use: -**
See Multan Board Answer No: 11

Chapter No: 2 1 SQ
Multan Board

Questions

1. Classify lipids. (Multan Board-1st Annual 2007)
2. Write down functions of Lipids. (Multan Board-1st Annual 2007)
3. Write down four differences between RNA and DNA. (Multan Board-1st Annual 2007)
4. How is a peptide bond formed? (Model Paper of Multan Board-2006-2008)
5. Give three functions of protein. (Multan Board-1st Annual 2008)
6. Make structural formula of Ribofuranose. (Multan Board-1st Annual 2008)
7. What is Heat of Vaporization? Give its significance. (Multan Board-2nd Annual 2008)
8. What is a Peptide Bond? How many Peptide Bonds are present in Glycylalanine.
(Multan Board-2nd Annual 2008)
9. Differentiate between Starch and Glycogen. (Multan Board-1st Annual 2009)
10. Write the function of mRNA. (Multan Board-1st Annual 2009)
11. Why are lipid called High Energy Compounds? (Multan Board-2nd Annual 2009)
12. What is NAD abbreviated for? Give its function? (Multan Board-2nd Annual 2009)
13. How much energy is used for the synthesis of 10.0 gm of glucose? (Multan Board-1st Annual 2010)
14. Draw the structural formula of sucrose. (Multan Board-1st Annual 2010)
15. Define Biochemistry. (S-2010)
16. Wirtte the names of Nitrogen bases in Phospholipids. (S-2010)
17. Draw structure of Peptide bond between two Amino Acids. (A-2011)
18. Give four functions of Proteins. (A-2011)
19. How fatty acids of animals differ from plants regarding their structure? (S-2011)
20. Draw the ring shaped Gluco Pyranose. (S-2011)
21. Name macromolecules. Why they form structures of cells? (A-2012)
22. Write any two protective functions of water. (A-2012)
23. What are Pyrimidines and Purines. (A-2013-New)
24. What are Waxes? (A-2013-Old)
25. Define Terpenoids.(A-2013-Old)
26. What are Amino Acids? (A-2013-Old)

Answers

1. **Clasification of Lipids: -**
Lipids have been classified as:
 1. Acylglycerol
 2. Waxes
 3. Phospholipids

4. Sphingolipids
5. Glycolipids
6. Terpenoids including carotenoids and steroids

2. Functions of Lipids: -

1. They store double the amount of energy as compared to same amount of any carbohydrate.
2. They provide insulation against atmospheric heat.
3. They provide mechanical protection.
4. They provide protection from abrasive damage.
5. They form components of cellular membranes.

3. Differences between RNA and DNA:

| DNA | RNA |
|---|--|
| 1. It has two polynucleotide chains (i.e. double stranded) . | 1. It has only one olynucleotide chain (i.e. single stranded). |
| 2. It has de-oxyribose pentose sugar. | 2. It has ribose pentose sugar. |
| 3. It has adenine, guanine, cytosine and thymine bases. | 3. It has adenine, guanine, cytosine and uracil bases. |
| 4. It is double helix with base Pairing. | 4. Its structure is not helical with exposed bases. |

4. Formation of Peptide Bond: -

Peptide bond is a C-N formed between the carbon of carboxyl group of one amino acid and nitrogen of amino group of other amino acid as aresult of condensation reaction between

carboxyl group of one amino acid and amino group of another amino acid.

Or

The bond formed between the carbon of carboxyl group of one amino acid and nitrogen of amino group of other amino acid is called peptide bond. Or

The peptide bond is formed between Carbon and Nitrogen (C-N) by the condensation

reaction of Carboxyl group of one amino acid and Amino group of another amino acid.

5. Three Functions of Proteins: -

1. They, in the form of enzymes, control the whole metabolism of the cell.
2. They, as hormones, regulate metabolic processes.
3. They help in blood clotting.

6. Structural formula of Ribofuranose

7. A) Heat of Vaporization:

The amount of heat energy that must be supplied to change the one gram of a substance from liquid phase to the vapor phase is called heat of vaporization.
Or
Heat of vaporization is expressed as calories absorbed per gram vaporized.

B) Significance:-

- 1. It plays an important role in the regulation of heat produced by oxidation.
- 2. It provides cooling effect to plants and animals.

8. A) Peptide Bond: -

It is a covalent carbon-to-nitrogen (C-N) bond linking two amino acids together formed as a result of condensation reaction between carboxyl group of one amino acid and amino group of another amino acid.

B) Number of Peptide Bonds present in Glycine: -

Only one Peptide Bond is present in Glycylalanine.

9. Differences between Starch and Glycogen:

| Starch | Glycogen |
|---|--|
| 1. It is the storage form of glucose in plants. | 1. It is the storage form of glucose in animals. |
| 2. It gives blue color with iodine. | 2. It gives red color with iodine. |

10. Function of mRNA: -

The function of mRNA is to carry the genetic information from DNA to ribosome where amino acids are arranged according to information in mRNA to form specific protein molecules.

11. Lipids called High Energy Compounds:

Lipids are called High Energy Compounds because of:

- a) Higher proportion of C-H bonds
- b) Very low proportion of Oxygen

12. A) Abbreviation of NAD: NAD is a dinucleotide which is abbreviated for Nicotineamide Adenine Dinucleotide.

B) Function: It (acting as an important co-enzyme) transports electrons during oxidative phosphorylation and fermentation reactions.
Or
It accepts electron and carries hydrogen and acts as an important coenzyme in several Oxidation-Reduction Reactions in the cell.

13. Energy used for the Synthesis of 10.0 gm of Glucose: -

717.6 kcal of solar energy is used for the synthesis of 10.0 gm of glucose.

14. Structural Formula of Sucrose

- 15. Biochemistry: -**
Biochemistry is the branch of science which deals with the study of chemical compounds and chemical processes in living organisms. Or
Chemistry of living organisms is called Biochemistry.
- 16. Names of Nitrogen bases in Phospholipids: -**
Nitrogen bases in Phospholipids are Choline, Ethanolamine, and Serine.
- 17. Structure of Peptide bond between two Amino Acids**
- 18. Four functions of Proteins:**
1. They build many structures of the cell.
 2. They cause the movement of organs and organisms and movement of chromosomes during anaphase of cell division.
 3. Some proteins work as carriers and transport specific substances such as oxygen (e.g. hemoglobin), lipids, metal ions etc.
 4. They, in the form of enzymes, control the whole metabolism of the cell.
- 19. Differences between Fatty Acids of Animals and Plants:**
- | Fatty Acids of Animals | Fatty Acids of Plants |
|--|--|
| 1. They are of straight chain. | 1. They may be branched or ringed. |
| 2. They contain no double bond and are called Saturated Fatty Acids. | 2. They have one to six double bonds and are called Unsaturated Fatty Acids. |
- 20. Ring shaped Gluco Pyranose or Glycopyranose**
- 21. A) Macromolecules:** Cellulose, Fats, Proteins etc.
B) Why they form structures of cells: They are generally insoluble in water, hence they form structures of cells.
- 22. Two Protective Functions of Water:**
1. Water is present in the membranes around the organs and forms a fluid cushion around the organs that help to protect from trauma.

2. It is effective lubricant that provides protection against damage resulting from friction. For example, tears protect the surface of eye from the rubbing of eyelids.

23. A) Pyrimidines: -

1. Purines are single-ringed nitrogenous bases present in nucleic acids.
2. They include cytosine (C), thymine (T), and Uracil (U).
3. Cytosine is found in both DNA and RNA, while thymine is found only in DNA and uracil only in RNA.

B) Purines: -

1. Purines are double-ringed nitrogenous bases present in nucleic acids.
2. They include Adenine (A) and Guanine (G) which are found in both RNA and DNA.

24. Waxes:

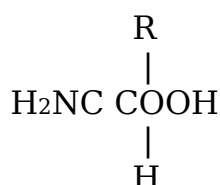
See Lahore Board Answer No: 14

25. Terpenoids: -

See Bahawalpur Board Answer No: 1

26. Amino Acids: -

1. Amino acids are units or building blocks of protein.
2. They are organic compounds which contain at least one basic amino group ($--NH_2$), one acidic carboxyl group ($--COOH$), one hydrogen atom (H) and one R group attached to the same carbon atom called alpha carbon.
3. They have a following general formula.



R is the radical group. It shows the great variety of structures e.g in glycine R is H, in serine R is CH_2OH and in alanine R is CH_3 .

Bahawalpur Board

Questions

1. What are terpenoids? (Bahawalpur Board-2007)
2. What are conjugated molecules? (Bahawalpur Board-2007)
3. Name different types of Lipids. (Bahawalpur Board-2008)
4. What is Glycogen? (Bahawalpur Board-2008)
5. Define Bio-Chemistry. What is the percentage of water in a Bacterial Cell? (Bahawalpur Board-2009)
6. What are Nucleohistones? (Bahawalpur Board-2009)
7. What is Glycosidic Bond? (A-2010)
8. What is the function of mRNA? (A-2010)
9. Show Peptide Bond between two Amino Acids. (A-2011)
10. What are conjugated molecules? Give an example. (A-2011)
11. What are Glycosidic Bonds? (A-2012)
12. Differentiate between Amylose and Amylopectin. (A-2012)
13. How amino acids differ from one another? (A-2013)

Answers

1. Terpenoids:

Terpenoids are the compounds of isoprenoid units uniting by condensation in different ways.

Examples: Rubber, Vitamins, Cholesterol etc.

2. Conjugated Molecules: -

The molecules which are formed by the combination of bio-molecules of two different groups or categories are called Conjugated molecules.

Examples: Glycoproteins, Nucleohistones, Lipoproteins etc. Or

When two different molecules belonging to different categories are combined they form

Conjugated Molecules.

Example: When a molecule of Carbohydrate combines with Protein they form Glycoprotein.

3. Different Types of Lipids: -

Different types of lipids are:

1. Acylglycerol
2. Waxes
3. Phospholipids
4. Sphingolipids
5. Glycolipids
6. Terpenoids including carotenoids and steroids

4. Glycogen: -

1. Glycogen is a polysaccharide (a complex carbohydrate).
2. It is the polymer of glucose and the chief form of carbohydrate stored in animal body.
3. It is found abundantly in liver and muscles.
4. It is insoluble in water.
5. It gives red color with iodine.

5. A) Biochemistry: -

See Multan Board Answer No: 15

B) Percentage of Water in a Bacterial Cell:

The percentage of water in a Bacterial Cell is 70.

6. Nucleohistones: -

1. Nucleohistones are conjugated molecules formed by the combination of DNA and histone proteins.
2. They are structural part of chromosomes.
3. They play an important role in regulation of gene expression.

7. Glycosidic Bond: -

The covalent bond or linkage between two monosaccharides is called glycosidic bond or linkage.

8. Function of mRNA: -

See Multan Board Answer No: 10

9. Peptide Bond between Two Amino Acids: -

See Multan Board Answer No: 17

10. Conjugated Molecules with examples: -

See Bahawalpur Board Answer No: 2

11. Glycosidic Bonds: -

See Bahawalpur Board Answer No: 7

12. Differences between Amylose and Amylopectin Starches:

| Amylose Starches | Amylopectin Starches |
|---|--|
| 1. They have branched chains of glucose. 2. They are insoluble in hot or cold water. | 1. They have un-branched chains of glucose. 2. They are soluble in hot water. |

13. Difference between Amino acids:

Amino acids differ from one another by R group. R is the radical group. For each amino acid

there is a different R group. For example in glycine R is H, in serine R is CH₂OH and in

alanine R is CH₃. For naturally occurring 20 amino acids there are 20 different R groups.

Dera Ghazi Khan Board
Questions

1. Write down the functions of carbohydrates. (Dera Ghazi Khan Board-2008)
2. Differentiate between Fibrous and Globular proteins. (Dera Ghazi Khan Board-2008)
3. What are polysaccharides? (Dera Ghazi Khan Board-2009)
4. Write down the general formula for Amino acids. (Dera Ghazi Khan Board-2009)
5. Differentiate between Catabolism and Anabolism. (A-2011)
6. Define heat of vaporization. What is heat of vaporization of water? (A-2011)
7. Differentiate between Glycosidic and Peptide Bonds. (A-2012)
8. Why lipids considered as high energy compounds than carbohydrates? (A-2012)
9. Write a note on Glycogen. (A-2013)

Answers

1. Functions of Carbohydrates:

1. They are found in organism abundantly and in almost all parts of the cell.
2. Some carbohydrates (e.g cellulose, peptidoglycan) are the main constituents of cell walls in plants and microorganisms.
3. They are present in grapes, figs, dates, fruits grains, seeds tubers, sugar cane, milk etc.
4. Simple carbohydrates are the main source of energy in cells.

2. Differences between Fibrous Protein and Globular Proteins:

| Fibrous Proteins | Globular Proteins |
|--|-------------------------------|
| 1. They have one or more polypeptide chains in the | 1. They have many polypeptide |

| | |
|---|---|
| form of fibrils. 2. Secondary structure is most important in them. 3. They are insoluble in aqueous media. 4. They are non-crystalline. 5. They perform structural role in cells and organisms. <u>Examples:</u> Myosin, Fibrin, Keratin. | chains folding upon one another forming spherical or ellipsoidal three dimensional structure. 2. Tertiary structure is most important in them. 3. They are soluble in aqueous media. 4. They can be crystallized. 5. They disorganize with changes and can not perform structural role in cells and organisms. <u>Examples:</u> Enzymes, Antibodies, Hormones, Hemoglobin. |
|---|---|

3.

Polysaccharides:

1.

Polysaccharides are most complex and most abundant carbohydrates in nature.

2.

They are formed by several monosaccharide units linked by glycosidic bonds.

3.

They are usually branched.

4.

They are tasteless.

5.

They have high molecular weight.

6.

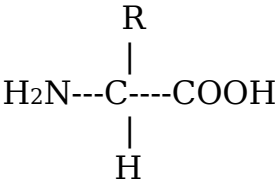
They are sparingly soluble in water.

Examples:

Starch, Glycogen, Cellulose, Dextrin, Chitin Agar, Pectin etc.

4.

General Formula for Amino Acid



5.

Differences between Anabolism and Catabolism:

| Anabolism | Catabolism |
|---|---|
| 1. Smaller molecules unite to form larger molecules. 2. Energy is utilized. <u>Example:</u> Photosynthesis | 1. Larger molecules are broken down into smaller molecules. 2. Energy is released. <u>Example:</u> Respiration |

6.

A) **Heat of Vaporization:**

The amount of heat energy that must be supplied to change the one gram of a substance from liquid phase to the vapor phase is called heat of vaporization.

Or

Heat of vaporization is expressed as calories absorbed per gram vaporized.

B) **Heat of Vaporization of Water:**

The Heat of Vaporization of Water is 574 kcal /kg.

7. **Differences between Glycosidic and Peptide Bonds: -**

| Glycosidic Bond | Peptide Bond |
|--|--|
| 1. It is a covalent bond between two monosaccharide molecules. | 1. It is a covalent bond between two amino acid molecules. |
| 2. It is a carbon oxygen (C-O-C) association. | 2. It is a carbon nitrogen (C-N) association. |

8. **Lipids as High Energy Compounds than Carbohydrates: -**

Because of higher proportion of C-H bonds and very low proportion of oxygen lipids store the double amount of energy as compared to the same amount of any carbohydrate.

9. **Glycogen: -**

See Bahawalpur Board Answer No: 4

Lahore Board
Questions

1. What is an ester? Express it with equation. (Lahore Board-2006)
2. Nucleic acids are polymers of units of which components? (Lahore Board-2007)
3. Make a sketch of general formula of amino acids. (Lahore Board-2007)
4. What is general formula for the amino acid? (Lahore Board-2008)
5. What are anabolic and catabolic reactions? (Lahore Board-2008)
6. Differentiate between Starch and Glycogen. (Lahore Board-2009)
7. Differentiate between fibrous proteins and globular proteins. (Lahore Board-2009)
8. What are conjugated molecules? Give example. (Lahore Board-2010)
9. Show peptide bond between two amino acids. (Lahore Board-2010)
10. What are ester compounds? Give example. (A-2011)
11. What are conjugated molecules? Give examples. (A-2011)
12. Differentiate between amylase and amylopectin starches. (A-2012)
13. How fibrous proteins differ from globular proteins? (A-2012)
14. What do you know about waxes? (A-2012)
15. What are conjugated molecules? Give example. (A-2012)
16. Draw peptide linkage between glycine and alanine. (Group I-A-2013)
17. Write down general formula of amino acid. (Group II-A-2013)

Answers

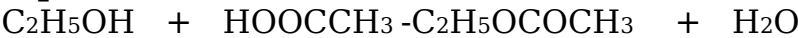
1. **A) Ester:**

An ester is a compound produced as result of a chemical reaction between alcohol and acid with the removal of water.

Or

An ester is a compound formed by condensation of an acid with alcohol. Or
It is also a bond formed between acid (usually carboxyl acid) and alcohol with the removal of water.

B) Equation:



2. **Units of Nucleic Acids: -**

Nucleic acids are polymers of Nucleotides.

3. **Sketch of general formula of Amino acid:**

See Dera Ghazi Khan Board Answer No: 4

4. **General formula for Amino acid:**
See Dera Ghazi Khan Board Answer No: 4

5. **A) Anabolic Reactions:** A series of chemical reactions in which simple substances
energy is
the cells in
complex
are combined to form complex substances and
needed are called Anabolic Reactions Or
Anabolic reactions are the chemical reactions in
which simple substances are combined to form
substances and energy is needed.
Example: Photosynthesis_

B) Catabolic Reactions: A series of chemical reactions in which energy is released
simpler ones
the cells in
complex
by the break down of complex molecules into
are called Catabolic Reactions Or
Catabolic reactions are the chemical reactions in
which energy is released by the breakdown of
molecules into simpler ones.
Example: Respiration

6. **Differences between Starch and Glycogen:**

| Starch | Glycogen |
|---|--|
| 1. It is the storage form of glucose in plants. | 1. It is the storage form of glucose in animals. |
| 2. It gives blue color with iodine. | 2. It gives red color with iodine. |

7. **Differences between Fibrous Proteins and Globular Proteins: -**
See Dera Ghazi Khan Board Answer No: 1

11. **Conjugated Molecules:**
See Bahawalpur Board Answer No: 2

9. **Peptide Bonds between Two Amino Acids: -**
See Multan Board Answer No: 17

10. **A) Ester:**
See Lahore Board Answer No: 1 (A)
B) Example: -
An acylglycerol is neutral ester of glycerol and one to three fatty acids.

11. **Conjugated Molecules:**
See Bahawalpur Board Answer No: 2

12. **Differences between Amylase and Amylopectin Starches:**
See Bahawalpur Board Answer No: 12

12. **Differences between Fibrous Proteins and Globular Proteins: -**
See Dera Ghazi Khan Board Answer No: 2

14. **Waxes:**
A wax is a mixture of long-chain alkanes (with odd number of carbon atoms ranging from
141

C₂₅ to C₃₅) and alcohol ketones and ester of long-chain fatty acids Or
A wax is an ester of long-chain of fatty alcohol and a long-chain fatty acid.

Or

The name wax is given to fatty acid ester of any long chain alcohol other than glycerol.

15. Conjugated molecules with examples:

See Bahawalpur Board Answer No: 2

16. Peptide linkage between Glycine and Alnine: -

See Multan Board Answer No: 17

17. General Formula of Amino acid: -

See Dera Ghazi Khan Board Answer No: 4

Gujranwala Board Questions

1. Differentiate between Fibrous proteins and Globular proteins. (Gujranawala Board-2006)
2. What is the function of m RNA? (Gujranawala Board-2006)
3. What is specifi heat capacity? (Gujranawala Board-2007)
4. How is peptide bond formed? (Gujranawala Board-2007)
5. Draw structural formula of Glycopyranose. (Gujranawala Board-2008)
6. Name the different types of RNA molecules. (Gujranawala Board-2008)
7. Why is the heat capacity of water very high? (Gujranawala Board-2009)
8. What is the percentage of glucose in the blood of a healthy person? (Gujranawala Board-2009)
9. What are conjugated molecules? Give examples. (Gujranawala Board-2010)
10. Give chemical composition of wax. (Gujranwala Board-2010)
11. Draw the sketch of ATP molecule (nucleotide). (A-2011)
12. Compare alpha helix structure and beta-pleated sheet in proteins. (A-2011)
13. Name two reducing sugars. Also mention the name of most familiar disaccharides. (A-2012)
14. How many chains are present in hemoglobin? Also give amino-acids' number in each chain. (A-2012)
15. Differentiate between nucleoside and nucleotide (A2013)

Answers

1. Differences between Fibrous Proteins and Globular Proteins: -

See Dera Ghazi Khan Board Answer No: 2

2. Function of m RNA:

See Bahawalpur Board Answer No: 8

3. Specifi Heat Capacity:

It is the amount of heat energy that must be supplied to raise the temperature of 1 g of a

substance by one degree centigrade.

Or

The amount of heat required to raise the temperature of 1 g of a substance by 1 C is called

heat of capacity of that substance.

4. Formation of Peptide Bond: -

See Multan Board Answer No: 4

5. **Structural formula of Glycopyranose: -**
See Multan Board Answer No: 20

6. **Different Types of RNA Molecules: -**
Different types of RNA molecules are:
 - a) Massenger RNA abbreviated as mRNA
 - b) Ribosomal RNA abbreviated as rRNA
 - c) Transfer RNA abbreviated as tRNA

7. **Very Heat Capacity of Water: -**
The heat capacity of water is very high because much of the energy is used to break hydrogen bonds between water molecules instead of changing its own temperature.

8. **The Percentage of Glucose in Blood:**
The percentage of glucose in the blood of healthy person is 0.08.

9. **Conjugated Molecules: -**
See Bahawalpur Board Answer No: 2

10. **Chemical Composition of Wax:**
Chemically, Wax is a mixture of long chain alkanes (with odd number of carbons ranging from C25 to C35) and alcohols, ketone and esters of long chain fatty acids

11. **The Sketch of ATP molecule (nucleotide)**

12. Comparison of Alpha Helix Structure and Beta-pleated Sheet in Proteins

| Alpha Helix Structure | Beta-pleated Sheet |
|---|--|
| 1. It is an example of Secondary Structure of Protein. 2. It is spirally coiled polypeptide chain in which 3.6 amino acids are presnt in each turn and this spiral structure is maintained by hydrogen bonds between nearby amino acids. | 1. It is also an example of Secondary Structure of Protein. 2. It is like a folded sheet which is formed by the folding back of the polypeptides (i.e amino acids change their directions). |

13. **A) Reducing Sugars:** Glucose, Lactose
B) Most Familiar Disaccharides: Maltose (Malt Sugar), Sucrose (Cane Sugar) and Lactose (Milk Sugar)

14. Number of Chains in Hemoglobin and Number of Amino acids in each Chain: -

Four polypeptide chains are present in globin of Hemoglobin in which two are alpha and other two are beta chains. Each alpha chain contains 141 amino acids, while each beta chain contains 146 amino acids.

15. Differences between nucleoside and nucleotide: -

| Nucleoside | Nucleotide |
|---|---|
| It is a compound formed by combination of a base and a pentose sugar. | It is a compound formed by combination of a base, a pentose sugar and one to three phosphoric acid molecules. |

Rawalpindi Board
Questions

1. Draw the structural formula of Glucopyranose. (Rawalpindi Board-2010)
2. What is the secondary structure of proteins? (A-2011)
3. Differentiate between Anabolic and Catabolic Reactions. (A-2011)
4. What is the importance of ATP? (A-2012)
5. What is NAD? (A-2012)
6. Write down general formula of an amino acid. (A-2013)

Answers

- 1. Structural Formula of Glucopyranose:**
See Multan Board Answer No: 20
- 3. Differences between Anabolic Rection (Anabolism) & Catabolic Reaction (Catabolism):**
See Dera Ghazi Khan Board Answer No: 5
- 2. Secondary Structure of Proteins: -**
Secondary structure of proteins is that structure in which polypeptide chains in protein molecules do not lie flat, instead they become spirally coiled forming Alph Helix or fold back in sheet like structure forming Beta Pleated Sheet or they are randomly coiled.
- 4. Importance of ATP:**
ATP is an important nucleotides used as an energy currency by the cell. It is an unstable molecule which crries energy from place to place within a cell.It releases energy on hydrolysis of terminal bond of Phospate in it which is utilized to derive energy demanding reactions such as in synthesis of proteins, lipids, carbohydrates, mechanical energy for cyclosis, cell division, movement of flagella, active transport etc.
- 5. NAD:**
NAD or Nicotineamide Adenine Dinucelotide is an example of Dinucleotide (made up of

144

two nucleotides) and is an important coenzyme in several oxidation-reduction reactions in the cell.

6. **General Formula of an Amino Acid: -**
See Dera Ghazi Khan Board Answer No: 4

Sargodha Board Questions

1. Draw structural formula of Glucopyranose. (Sargodha Board-2010)
2. What are Anabolic and Catabolic reactions? (Sargodha Board-2010)
3. Which is the most abundant Carbohydrate in nature? Where is it found in pure form? (A-2011)
4. Why Lipids store double amount of energy as compared to the same amount of any Carbohydrate? (A-2011)
5. What is Biochemistry? Give its importance. (A-2012)
6. Differentiate between Amylose and Amylopectin Starches. (A-2012)
7. Differentiate between Amylose and Amylopectin. (A-2013)

Answers

1. **Structural formula of Glucopyranose: -**
See Multan Board Answer No: 20
2. **Anabolic and Catabolic Reactions: -**
See Lahore Board Answer No: 5
3. **Most Abundant Carbohydrate in Nature and its Pure Form:**
The most abundant Carbohydrate in nature is Cellulose which is found in pure form in Cotton.
4. **Lipids as High Energy Compounds than Carbohydrates: -**
Lipids store double the amount of energy as compared to the same amount of any Carbohydrate because they have higher proportion of C-H bonds and very low proportion of Oxygen.
5. **A) Biochemistry:**
See Multan Board Answer No: 15
B) Importance:
It explains the biochemical basis of life. It is essential for understanding anatomy and physiology because all the structures of organisms have biochemical organization and can be described in biochemical terms.
6. **Difference between Amylose and Amylopectin Starches: -**
See Bahawalpur Board Answer No: 12
7. **Difference between Amylose and Amylopectin: -**
See Bahawalpur Board Answer No: 12

Faislabad Board Questions

1. How is the peptide bond formed? (Faisalaad Board-2007)
2. What are terpenoids? Give examples. (Faisalaad Board-2008)
3. Define Biochemistry and mention its importance. (Faisalaad Board-2008)
4. Write the general formula of a typical amino acids. (Faisalaad Board-2009)
5. Define Peptide bond and show it between two amino acids. (Faisalaad Board-2009)
6. How is the peptide bond formed? (Faisalaad Board-2010)
7. Give the general formula of amino acid. (Faisalaad Board-2010)
8. What are conjugated molecules? (Faisalaad Board-2010)
9. What is the function of mRNA? (Faisalaad Board-2010)
10. What are terpenoids? Give examples. (A-2011)
11. Write structural formula of Glucose and Fructose. (A-2011)
12. Write down four functions of Proteins. (A-2012)
13. What is conjugated molecule? Give example. (A2012)
14. Differentiate between Amylose and Amylopectin Starches. (A-2013)

Answers

1. **Formation of Peptide Bond: -**
See Multan Board Answer No: 4
2. **Terpenoids: -**
See Bahawalpur Board Answer No: 1
3. **A) Biochemistry: -**
See Multan Board Answer No: 15
B) Importance of Biochemistry:
See Sargodha Board Answer No: 5 (B)
5. **A) Peptide Bond:**
See Multan Board Answer No: 8 (A)
B) Peptide Bond between Two Amino Acids: -
See Multan Board Answer No: 17
6. **Formation of Peptide Bond: -**
See Multan Board Answer No: 4
7. **General Formula of Amino Acid: -**
See Dera Ghazi Khan Board Answer No: 4
8. **Conjugated Molecules: -**
See Bahawalpur Board Answer No: 2
9. **Function of mRNA: -**
See Multan Board Answer No: 10
10. **Terpenoids: -**
See Bahawalpur Board Answer No: 1
11. **Structural formula of Glucose**

Structural Formula of Fructose

12. Four Functions of Protein: -

1. They build many structures of the cell.
2. They, in the form of enzymes, control the whole metabolism of the cell.
3. They, as hormones, regulate metabolic processes.
4. They help in blood clotting.

13. Conjugated Molecules: -

See Bahawalpur Board Answer No: 2

14. Difference between Amylose and Amylopectin Starches: -

See Bahawalpur Board Answer No: 12

Chapter No: 3 3 SQs
Multan Board

Questions

1. Define Apoenzyme and Holoenzyme. (Multan Board-1st Annual 2007)
2. How does low and high temperature affect Enzyme activities? (Multan Board-1st Annual 2007)
3. What is prosthetic group? (Multan Board-2nd Annual 2007)
4. How does enzyme concentration affect the rate of reaction? (Model Paper of Multan Board-2006-2008)
5. What is Co-factor? (Multan Board-1st Annual 2008)
6. How irreversible inhibitors inhibit enzyme activity? (Multan Board-1st Annual 2008)
7. Why vitamins are needed in very small amount? (Multan Board-2nd Annual 2008)
8. Define Enzyme and Active Site. (Multan Board-1st Annual 2009)
9. Write the effect of pH on Enzyme Action. (Multan Board-1st Annual 2009)
10. What is Optimum pH? Give Optimum pH of Pepsin. (Multan Board-2nd Annual 2009)
11. Differentiate between Prosthetic group and Coenzyme. (Multan Board-2nd Annual 2009)
12. Define Inhibitors of Enzymes. (Multan Board-1st Annual 2010)
13. How do high temperatures affect an Enzyme Activity? (A-2011)
14. What is Induced-Fit Model for Enzyme Activity? (S-2011)
15. Distinguish between Prosthetic group and Coenzyme. (A-2012)
16. What is an activator? (A-2013-New)
17. Differentiate between Apo-enzyme and Holo-enzyme. (A-2013-New)
18. What do you know about Optimum pH? (A-2013-New)
19. Define Activator. (A-2013-Old)

Answers

1. A) Apoenzyme:

An Apoenzyme is an inactive core enzyme with its coenzyme or prosthetic group (i.e. cofactor) removed.

B) Holoenzyme:

Holoenzyme is an activated enzyme consisting of polypeptide chain along with its cofactor (i.e. coenzyme or prosthetic group).

2. Low and High Temperature Affecting Enzyme Activity:

The enzyme activity is maximum at a specific temperature called Optimum Temperature, above and below this temperature its rate of reaction decreases. At very high temperatures, enzymes are destroyed (denatured) but at very low temperature

enzymes are not destroyed.

3. Prosthetic Group: -

A prosthetic group is an essential co-factor (non-protein part) that assists the enzyme and is attached covalently to the enzyme.

4. Effect of Enzyme Concentration at the Rate of Reaction: -

The rate of reaction depends directly on the concentration of enzyme. By increasing the enzyme molecules, an increase in the number of active sites takes place and products are formed. After a certain limiting concentration, the rate of reaction will no longer depend upon this increase.

5. Cofactor: -

1. Cofactors are non-protein part of some enzymes which are essential for the proper functioning of the enzymes.

2. They usually act as bridge between enzymes and their substrates.

3. Cofactors often contribute directly to the chemical reactions and bring about catalysis.

4. Sometimes co-factors provide a source of chemical energy, helping to derive reactions which would otherwise be difficult or impossible.

5. Cofactors may be essential ions or complex organic molecules.

Or

Cofactor is nonprotein part of the enzyme which assists the enzyme in catalysis and

often acts as a bridge between enzyme and substrate. Or

The term cofactor is used to describe inorganic ions or organic molecules that assist enzymes in their performance as catalysis.

6. Irreversible Inhibitors inhibiting Enzyme Activity:

Irreversible inhibitors inhibit or check the enzyme activity by destroying globular

structure of the enzyme or forming covalent bonds with the active sites of enzymes thus

permanently occupying or blocking the active sites. Or

Irreversible inhibitors check the reaction rate of enzymes by one of the following way:

a) By destroying its globular structure

b) By in-activating the enzyme permanently by:

i. Occupying the active site by forming covalent bond with it

ii. Physically blocking the active site permanently

7. Vitamins Needed in Very Small Amount: -

Vitamins act as essential raw materials from which coenzymes are made. Their very small

amount is needed because they, like enzymes, are used again and again.

8. A) Enzyme:

An enzyme is a protein molecule that functions as an organic or biological catalyst to speed a chemical reaction, while itself remaining unchanged.

B) Active Site:

Active site is a small three dimensional charged cavity of enzyme made up of many amino acids of enzyme and takes part in a chemical reaction and binds to a substance called substrate.

9. Effect of pH on Enzyme Action: -

- 1. Each enzyme has its optimal pH at which it works most effectively.
 - 2. A slight change in pH can change the ionization of the amino acids at the active site as well as ionization of substrate and disrupts the normal function of the enzyme.
 - 3. Extreme changes in the pH cause the denaturation of enzymes.
- Or
- Rate of enzyme action varies considerably with pH and there is a narrow range of optimum pH for each enzyme e.g. pepsin of stomach has an optimum pH of 2.0. A slight change in the pH changes the ionization of amino acids at active site as well as ionization of the substrate due to which enzyme activity is either retarded or blocked completely. Extreme changes in pH cause the bonds in the enzyme to break, resulting in the enzyme denaturation.

- 10. A) Optimum pH: -**
pH at which rate of reaction is highest is called Optimum pH.
- B) Optimum pH of Pepsin:**
The Optimum pH of Pepsin is 2.00

11. Differences between Prosthetic group and Coenzyme:

| Prosthetic group | Coenzyme |
|--|--|
| 1. It is a cofactor which forms covalent bond with the enzyme and hence is tightly attached. | 1. This cofactor is loosely attached with the enzyme forming no covalent bond with it. |
| 2. It is not closely related to vitamins. | 2. It is closely related to vitamins and has vitamin as its part. |

12. Inhibitors of Enzymes: -

- A substance that binds to an enzyme and decreases its activity is called an inhibitor. Or
- An inhibitor is a molecule that attaches itself to an enzyme and interferes with its ability to form an enzyme substrate complex. Or
- 1. Inhibitors are molecules that attach themselves to enzymes in place of substrates.
 - 2. They interfere the enzymes ability to form enzyme substrate complexes and hence no products are formed.
 - 3. They inhibit the enzyme activity permanently or temporarily. Or
- Inhibitors are chemical substances which can react (in place of substrate) with the

enzyme but is not transformed into product (s) and thus blocks the activity of enzyme

temporarily or permanently. Or

Substances which decrease the activity of enzyme are called Inhibitors.

Inhibitors may act

by combining directly with the enzyme or they may react with the activator indirectly

therefore the activator does not remain available to enzyme for activation.

Examples: Poisons like cyanide, Antibiotics, Antibodies, Antimetabolites and Some

Drugs

13. High Temperature Affecting an Enzyme Activity: -

The high temperature above optimal value provides the heat to the molecules of enzymes

which causes the vibrations of atoms making enzyme molecule too violent that globular

structure essential for enzyme activity is lost and the enzyme is said to be denatured.

14. Induced-Fit Model for Enzyme Activity: -

It states that:

1. When a substrate combines with enzyme, the active site of the enzyme

undergoes a slight change in shape.

2. This change in the shape of active site enables the enzyme to perform its

catalytic activity more effectively.

3. After the reaction has been completed and product (s) is released, the active

site returns to its original state. Or

Induced Fit Model for Enzyme Activity states that:

1. When the substrate binds to the enzyme molecule, it causes a change, known as

induced fit, in the shape of the enzyme.

2. Usually the shape of the substrate also changes slightly.

3. These changes facilitate the breakage of old bonds and formation of new ones. Thus the

substrate is changed into a product, which moves away from the enzyme.

4. The enzyme is then free to catalyze the reaction of more substrate molecules to form

more product molecules. Or

Induced Fit Model states that when substrate binds to an active site, an enzyme substrate

complex forms in which the shapes of the enzyme and substrate change slightly. This

facilitates the catalysis effectively. After the reaction has been completed, product(s) released,

and the active site returns to its original state, ready to bind another substrate molecule.

15. Differences between Prosthetic group and Coenzyme: -

See Multan Board Answer No: 11

16. Activator: -

1. It is detachable cofactor.

2. It is either activator ion or inorganic metal ion such as Mg^{2+} , Fe^{2+} , Cu^{2+} , Zn^{2+} etc.

Or

Detachable co-factor is known as an activator if it is an organic ion. Or Inorganic substance which increases the activity of an enzyme is called an activator.

Magnesium (Mg^{+2}) is an inorganic activator for the enzyme phosphatase and zinc ion

(Zn^{-2}) is an activator for enzyme carbonic anhydrase.

17. Differences between Apo-enzyme and Holo-enzyme: -
See Bahawalpur Board Answer No: 5

18. Optimum pH: -
See Multan Board Answer Number: 10 (A)

19. Activator: -
See Multan Board Answer No: 16

Bahawalpur Board
Questions

- 1. What is the effect of substrate concentration on enzyme action? (Bahawalpur Board-2007)
- 2. Differentiate between irreversible inhibitors and reversible inhibitors. (Bahawalpur Board-2007)
- 3. What are inhibitors? (Bahawalpur Board-2008)
- 4. What is Cofactor? (Bahawalpur Board-2008)
- 5. Differentiate between Holoenzyme and Apoenzyme. (Bahawalpur Board-2009)
- 6. What is Active Site? Name its two definite regions. (Bahawalpur Board-2009)
- 7. State Lock and Key Model of Enzyme Action. (A-2010)
- 8. What is the effect of temperature on Enzyme Action? (A-2010)
- 9. The active site of enzyme consists of two regions. Give their name and function. (A-2011)
- 10. Define Apoenzyme. (A-2012)
- 11. Differentiate between Apoenzyme and Holoenzyme. (A-2013)
- 12. Differentiate between Reversible and Irreversible Inhibitors. (A-2013)
- 13. What is Active Site? (A-3013)

Answers

1. Effect of Substrate Concentration on Enzyme Action:
Generally enzyme activity increases as substrate concentration increases. As more substrate molecules fill active sites, more product results per unit time. But when the amount of substrate is increased continuously keeping the enzyme concentration constant, enzyme's active sites are filled and rate of reaction does not increase any more.

2. Differences between Irreversible and Reversible Inhibitors:

| Irreversible inhibitors | Reversible Inhibitors |
|--|---|
| 1. They usually destroy the enzymes. | 1. They do not damage the enzymes. |
| 2. They physically block the active sites of the enzymes or form covalent bonds with the | 2. They form weak chemical bonds with the enzyme. |
| | 3. Activity of the enzyme is |

| | |
|--|---|
| active site. 3. Activity of the enzymes is stopped permanently. Example: Pesticides, poisons like cyanide | restored when the inhibitor is removed. Example: Malonic acid |
|--|---|

3.

Inhibitors: -

See Multan Board Answer No: 12
4.

Cofactor:

See Multan Board Answer No: 5
5.

Differences between Holoenzyme and Apoenzyme:

Holoenzyme is an activated enzyme consisting of polypeptide chain and a cofactor while

apoenzyme is an inactive enzyme with its coenzyme or prosthetic group (co-factor) removed.

| Or | |
|---|--|
| Holoenzyme | Apoenzyme |
| 1. It is an active enzyme. 2. It has two parts, the protein part consisting of polypeptide chain called Apoenzyme and a non-protein part which is either coenzyme or prosthetic group. | 1. It is an inactive enzyme. 2. It is an enzyme with its co-enzyme or prosthetic group removed. |

6.

A) **Active Site: -**

See Multan Board Answer No: 8 (B)

B) **Two Definite Regions of Active Site:**

Its two definite regions are bindinding site and catalytic site.
7.

Lock and Key Model of Enzyme Action: -

It states that:

1. One specific enzyme can transform only one substrate into product (s) just as one specific key can open only a specific lock.

2. Active site is a rigid and acts as a template only. There is no modification or flexibility in the active site before, during or after the enzyme action.
8.

Effect of Temperature on Enzyme Action: -

Enzymes are sensitive to temperature. Each enzyme has its optimum temperature for it its maximum activity. For enzymes of human body 37 C is the optimum temperature.

Rate of reaction increases with increase in temperature but upto a certain limit. All the enzymes are completely destroyed at 100 C. Rate of reaction decreases with the decrease in temperature and is reduced to minimum at 0 C but enzymes are not destroyed. Or
The enzyme activity is maximum at a specific temperature called Optimum Temperature, above and below this temperature its rate of reaction decreases. At very high temperatures, enzymes are destroyed (denatured) but at very low temperature enzymes are not destroyed.

9. **Names and Functions of Regions of Active Site of an Enzyme: -**

The active site of enzyme consists of two regions. Their name and function are:

1. **Binding Site** It helps the enzyme in recognition and binding of proper substrate to produce an ES Complex, due to which catalytic site becomes activated.
2. **Catalytic Site** Activated Catalytic Site catalyzes the transformation of the substrate into product.

10. **Apoenzyme: -**

An Apoenzyme is an inactive core enzyme with its coenzyme or prosthetic group (i.e cofactor) removed. Or
Apoenzyme is protein portion of an enzyme that requires the presence of a specific coenzyme or prosthetic group to become a complete functional enzyme.

11. **Differences between Apoenzyme and Holoenzyme: -**

See Bahawalpur Board Answer No: 5

12. **Differences between Reversible and Irreversible Inhibitors: -**

See Bahawalpur Board Answer No: 1

13. **Active Site:**

Active site is a small three dimensional charged cavity of enzyme made up of many amino acids of enzyme and takes part in a chemical reaction and binds to a substance called substrate. Or

The active sites of some enzymes are one or more grooves or cavities in the enzyme molecule formed by amino acid side chains. These are the regions where substrate come into close contact and thereby react more readily.

1. Active site is a small part of enzyme which takes part in a chemical reaction and binds to a substance called substrate.
2. It is a three dimensional cavity made up of many amino acids, the shape of which matches with the structure of particular substrate molecule.
3. It has a specific charge which is also complementary to its substrate.
4. It undergoes a slight change in shape when substrate combines to it.
5. It is made up of two definite regions i.e. binding site and catalytic site.
6. The binding site recognizes the proper enzyme and allows it to bind with it

forming ES complex.

7. The catalytic site activated by the ES complex catalyzes the transformation of substrate into product (s).

Dera Ghazi Khan Board Questions

1. What is prosthetic group? (Dera Ghazi Khan Board-2008)
2. Name factors affecting rate of enzyme action. (Dera Ghazi Khan Board-2008)
3. How does high temperature affect enzyme activity? (Dera Ghazi Khan Board-2009)
4. What are inhibitors? (Dera Ghazi Khan Board-2009)
5. Differentiate between Apoenzyme and Holoenzyme. (A-2011)
6. How temperature affects the rate of Enzyme Action? (A-2012)
7. What is the role of pH value on enzyme action? (A-2013)
8. What are apoenzymes and holoenzymes? (A-2013)
9. Discuss lock and key model for enzyme action. (A-2013)

Answers

1. **Prosthetic Group: -**
See Multan Board Answer No: 3
2. **Names of Factors Affecting Rate of Enzyme Action: -**
Following factors affect the rate of enzyme action.
 1. Enzyme Concentration
 2. Substrate Concentration
 3. Temperature
 4. pH Value
3. **High Temperature Affecting an Enzyme Activity: -**
See Multan Board Answer No: 13
4. **Inhibitors: -**
See Multan Board Answer No: 12
5. **Differences between Holoenzyme and Apoenzyme: -**
See Bahawalpur Board Answer No: 5
6. **Temperature affecting the Rate of Enzyme Action: -**
See Bahawalpur Board Answer No: 8
7. **Role of pH value on Enzyme Action: -**
See Multan Board Answer No: 9
8. **Apoenzymes and Holoenzymes: -**
See Multan Board Answer No: 1
9. **Lock and Key Model for Enzyme Action: -**
See Bahawalpur Board Answer No: 7

Lahore Board Questions

1. What is an optimal value of a factor during reaction? (Lahore Board-2006)
2. How does an enzyme accelerate a metabolic reaction? (Lahore Board-2007)

-
3. How do irreversible inhibitors check the reaction rate of enzymes? (Lahore Board-2007)
4. What do you mean by optimum pH for the enzyme? (Lahore Board-2008)
5. Differentiate between Lock and Key Model and Induce Fit Model. (Lahore Board-2009)
6. What is the effect of change of pH on the working of enzymes? (Lahore Board-2010)
7. Differentiate between activator and prosthetic group. (Lahore Board-2010)
8. Define Active Site of Enzymes. (A-2011)
9. Differentiate between Apoenzyme and Holoenzyme. (A-2012)
10. Differentiate between Enzyme and Co-enzyme. (A-2012)
11. What do you mean by induce fit model of enzyme action? (Group I-A-2013)
12. Differentiate between apoenzyme and holoenzyme. (Group I-A-2013)
13. Write down four characteristics of enzyme. (Group I-A-2013)
14. Define Holoenzyme. (Group II-A-2013)
15. State the effect of change in pH on activity of an enzyme. (Group II-A-2013)
16. Differentiate between prosthetic group and co-enzyme. (Group II-A-2013)

Answers

1. **Optimal Value of a Factor during Reaction: -**
Optimum means the best or most productive quantity or condition. Hence the optimal value of a factor during reactin is the value at which rate of reaction is maximum or product is formed most rapidly.
2. **Acceleration of a Metabolic Reaction by an Enzyme: -**
Enzyme lowers the amount of activation energy needed .The reduction in activation energy, by the enzyme, accelerates a metabolic reaction.
3. **Irreversible Inhibitors checking the Reaction Rate of Enzymes: -**
See Multan Board Answer No: 6
4. **Optimum pH for the Enzyme: -**
See Multan Board Answer Number: 10 (A)
5. **Differences between Lock and Key Model and Induce Fit Model:**

| Lock and Key Model | Induce Fit Model |
|---|--|
| 1. Active site is rigid. 2. There is no change in the active site, before, during or after thed enzyme action. | 1. Active site is flexible. 2. Active site is changed when a substrate molecule combines with it. After the enzyme action , it returns to its original state. |
6. **Effect of Change of pH on the Working of Enzymes:**
See Multan Board Answer No: 9

7. **Differences between Activator and Prosthetic group:**

| Activator | Prosthetic group |
|--|--|
| 1. It is detachable cofactor. 2. It is either activator ion or inorganic metal ion such as Mg^{2+} , Fe^{2+} , Cu^{2+} , Zn^{2+} etc. | 1. It is covalently bonded co-factor. 2. It is organic non proteineous group. |

8. **Active Site: -**

See Bahawalpur Board Answer No: 13

9. **Difference between Apoenzyme and Holoenzyme: -**

See Multan Board Answer No: 5

10. **Differences between Enzyme and Coenzyme:**

| Enzyme | Coenzyme |
|--|---|
| 1. It is an important group of protein. 2. Some, but not all, enzymes require coenzymes for their activity and become inactive without these. 3. Its molecule has no vitamin. Examples: Pepsin, Sucrase, Arginase etc. | 1. It is an organic molecule other than protein. 2. It always assists aspecific enzyme for its activity and is loosely attached with it. 3. It often has a vitamin as building unit. Example: NAD |

11. **Induce Fit Model of Enzyme Action: -**

See Multan Board Answer No: 14

12. **Differences between Apoenzyme and Holoenzyme: -**

See Bahawalpur Board Answer No: 5

13. **Four Characteristics of Enzyme: -**

1. An enzyme is a biological catalyst which greatly increases the speed of a chemical reaction without being consumed.
 2. An enzyme works by lowering the activation energy, the kinetic energy necessary to get a reaction going.
 3. Enzymes are highly specific. Most enzymes catalyze only a few closely related chemical reactions or, in many cases only one particular reaction.
 4. Some enzyme consist only of proteins, other enzymes require a co-factor for their proper functioning.
- Or
1. All enzymes are globular proteins.
 2. They increase the rate of reaction without themselves being used up.
 3. They are specific in their nature and their action.
 4. They lower the activation energy of the reactions.
- Or
1. Each enzyme has a specific three dimensional shape.

2. Each enzyme is made up of hundreds of amino acids joined together to form a globular structure.
3. They are specific to certain substrate or group of very similar substrate molecule.
4. Only a small amount of enzyme is actually needed in a cell because enzymes are not used by the reaction.

14. Holoenzyme: -

Holoenzyme is an activated enzyme consisting of polypeptide chain along with its cofactor

(i.e. coenzyme or prosthetic group). Or

Holoenzyme is a conjugated enzyme comprising polypeptide chain and a cofactor.

Holoenzyme is an active enzyme which contains two parts, the protein part consisting

of polypeptide chain called core enzyme or apoenzyme and a non protein part which is either coenzyme or prosthetic group.

15. Effect of Change in pH on Activity of an Enzyme: -

See Multan Board Answer No: 9

16. Differences between Prosthetic group and Co-enzyme: -

See Multan Board Answer No: 11

Gujranwala Board Questions

1. How does enzyme concentration affect the rate of enzyme action? (Gujranawala Board-2007)
2. Define inhibitors of the enzyme. (Gujranawala Board-2007)
3. Explain Induce Fit Model of Enzyme. (Gujranawala Board-2008)
4. What are competitive inhibitors? (Gujranawala Board-2008)
5. What Koshland proposed in 1959? (Gujranawala Board-2009)
6. What is the effect of extreme changes in pH on enzyme activity? (Gujranawala Board-2009)
7. Why competitive inhibitors are unable to make product? (Gujranawala Board-2010)
8. Write the basic difference between Lock and Key Model and Induce Fit Model of enzyme action. (Gujranawala Board-2010)
9. What is Induced Fit Model of Enzyme Action? (A-2011)
10. Distinguish between Reversible and Irreversible Inhibitors of Enzymes. (A-2012)
11. What is meant by co-factor? (A-2013)
12. Differentiate between competitive and non-competitive inhibitors. (A-2013)
13. Differentiate between apoenzyme and holoenzyme. (A-2013)

Answers

1. **Enzyme Concentration affecting the Rate of Enzyme Action:**
See Multan Board Answer No: 4

2. **Inhibitors of the Enzyme: -**
See Multan Board Answer No: 12

3. Induce Fit Model of Enzyme: -
See Multan Board Answer No: 14

4. Competitive Inhibitors:

1. They compete with the substrates for the same active site that allows either or both to combine with it. As long as the competitive inhibitor is combined with an enzyme, the enzyme is ineffective in its normal role.
 2. Usually a competitive inhibitor is structurally similar to substrate and fits into the active site and combines with the enzyme. However, it is not similar enough to substitute the normal substrate in the chemical reaction, and enzyme can not convert it into product.
 3. A competitive inhibitor occupies the active site only temporarily and does not permanently damage the enzyme.
 4. It occupies the active site for part of the time. If the concentration of the substrate is increased relative to the concentration of the inhibitor, the active site is usually occupied by the substrate reversing the competitive inhibition. Or
 1. Competitive inhibitor is similar to substrate.
 2. Because of its similarity with the substrate, it becomes attached to active site, so stopping the substrate from binding to the enzyme.
 3. It is unable to activate the catalytic site, so product is not formed.
- . **Example:** Malonic acid.

5. What Koshland Proposed: -

Koshland in 1959 proposed Induce Fit Model of Enzyme Action in which he stated that when a substrate combines with an enzyme, it induces changes in the enzyme structure due to which catalytic activity is performed more effectively.

6. Effect of Extreme Changes in pH on Enzyme Activity:

The effect of extreme changes in pH on enzyme activity is the denaturation of enzyme and the loss of its activity because they cause the bonds in the enzyme to break.

7. Competitive Inhibitors unable to make Product: -

Competitive inhibitors are unable to make product because they are unable to activate the catalytic site.

8. Differences between Lock and Key Model and Induce Fit Model: -
See Lahore Board Answer No: 5

9. Induced Fit Model of Enzyme Action: -
See Multan Board Answer No: 14

10. Differences between Reversible and Irreversible Inhibitors of Enzymes: -
See Bahawalpur Board Answer No: 2

11. Co-factor: -
See Multan Board Answer No: 5

12. Differences between competitive and non-competitive inhibitors:

See Sargodha Board Answer No: 3

13. Differences between Apoenzyme and Holoenzyme: -

See Bahawalpur Board Answer No: 5

Rawalpindi Board Questions

1. Define Co-factor. (A-2010)
2. Differentiate between Apoenzyme and Holoenzyme. (A-2011)
3. Define Competitive and Non-Competitive Inhibitors. (A-2012)
4. Define inhibitor with an example. (A-2013)
5. Write down the effect of high temperature on an enzyme. (A-2013)
6. At high substrate level, rate of enzyme reaction is not increased. Give reason. (A-2013)

Answers

1. Cofactor:

See Multan Board Answer No: 5

2. Differences between Apoenzyme and Holoenzyme: -

See Bahawalpur Board Answer No: 5_

3. A) Competitive Inhibitors:

Competitive inhibitors are the substances which compete with the substrate for the same

active site, displacing a percentage of substrate molecules from the enzymes. Or

Competitive inhibitors are reversible inhibitors which may be selected by the binding

site of the enzyme because of their similarity with the substrate but are unable to

activate the catalytic site, hence product (s) are not formed.

B) Non-Competitive Inhibitors:

Noncompetitive inhibitors are the substances that bind to the enzyme in a location other

than the active site, changing the shape of the enzyme and making it unable to bind to

the substrate. Or

Noncompetitive inhibitors are reversible inhibitors that form enzyme inhibitor complex

at a point other than the active site and alter the structure of enzyme in such a way that

even if substrate binds the active site, catalysis fails to take place.

4. Inhibitor with an example: -

See Multan Board Answer No: 12

5. Effect of High Temperature on an Enzyme: -

See Multan Board Answer No: 13

6. Reason: -

At high substrate level, rate of enzyme reaction is not increased because all the active sites

of enzyme active are filled and for additional substrate molecules active sites of enzyme are not

available.

Sargodha Board

Questions

- 1. What are enzyme inhibitors? (Sargodha Board-2010)
- 2. Give role of pH on the rate of enzyme action. (Sargodha Board-2010)
- 3. Diffrentiate between Competitive and Non-Competitive Inhibitors. (A-2011)
- 4. Give effect of pH on Enzyme Action. (A-2012)
- 5. What is induced fit model? (A-2013)
- 6. What is difference between pepsin and pepsinogen? (A-2013)
- 7. What is meant by inhibitors of Enzymes? (A-2013)

Answers

- 1. **Enzyme Inhibitors:**
See Multan Board Answe No: 12
- 2. **Role of pH on the Rate of Enzyme Action:**
See Multan Board Answer No: 9
- 3. **Differences between Competitive and Non-Competitive Inhibitors:**

| Competitive Inhibitors | Non-competitive Inhibitors |
|--|---|
| 1. It is similar to substrate. | 1. It is not similar to substrate. |
| 2. It forms enzyme inhibitor complex at active site. | 2. It forms enzyme inhibitor complex at a point other than active site. |
| 3. It does not change the shape of the enzyme. | 3. It changes the shape of the enzyme. |

- 4. **Effect of pH on Enzyme Action:**
See Multan Board Answer No: 9
- 5. **Induced Fit Model: -**
See Multan Board Answer No: 14
- 6. **Difference between Pepsin and Pepsinogen: -**

| Pepsin | Pepsinogen |
|---|---|
| 1. It is an active form of powerful protein digesting enzyme. | 1. It is an inactive form of protein digesting enzyme. |
| 2. It is formed from pepsinogen in the cavity of stomach. | 2. In the cavity of stomach it is converted into pepsin when it is exposed to HCl of gastric juice. |

7. **Inhibitors of the Enzymes:** -
See Multan Board Answer No: 12

Faislabad Board
Questions

- 1. Define inhibitors of enzyme. (Faisalaad Board-2007)
- 2. Write about the effect of the temperature on enzyme action. (Faisalaad Board-2007)
- 3. Differentiate between a Coenzyme and an Activator. Give one example in each case. (Faisalaad Board-2008)
- 4. Give the role of pH on the rate of enzyme action. (Faisalaad Board-2008)
- 5. Define an Apoenzyme. (Faisalaad Board-2009)
- 6. Differentiate between Competitive and Non-competitive inhibitors. (Faisalaad Board-2009)
- 7. Differentiate between apoenzyme and holoenzyme. (Faisalaad Board-2010)
- 8. What is the effect of concentration of enzyme on its activity? (Faisalaad Board-2010)
- 9. How do low and high temperatures respectively affect an enzyme activity? (A-2011)
- 10. How do Irreversible Inhibitors check the rate of reaction? (A-2012)
- 11. Describe lock and key model of enzyme action. (A-2013)
- 12. What is active site? Describe its two parts. (A-2013)
- 13. Define inhibitors and give examples. (A-2013)

Answers

- 1. **Inhibitors of Enzymes:**
See Multan Board Answer No: 12
- 2. **Effect of the Temperature on Enzyme Action:** -
See Bahawalpur Answer No: 8

3. **Differences between Activator and Coenzyme:**

| Activator | Coenzyme |
|--|--|
| 1. It is detachable cofactor. | 1. It is cofactor which is loosely attached with the enzyme. |
| 2. It is either activator ion or in-organic metal ion. | 2. It is non-proteneous organic molecule containing Vitamins as essential raw materials. |
| Example: Mg ²⁺ | Example: NAD |

- 4. **Role of pH on the Rate of Enzyme Action:**
See Multan Board Answer No: 9
- 5. **Apoenzyme:** -
An apoenzyme is an inactive core enzyme with its coenzyme or prosthetic group (i.e.cofactor) removed. Adding the correct concentrated coenzymeto the apoenzyme,
will restore enzyme activity. Or
Apoenzyme is a protein portion of an enzyme that requires the presence of a specific
coenzyme or prosthetic group to become a complete functional enzyme.

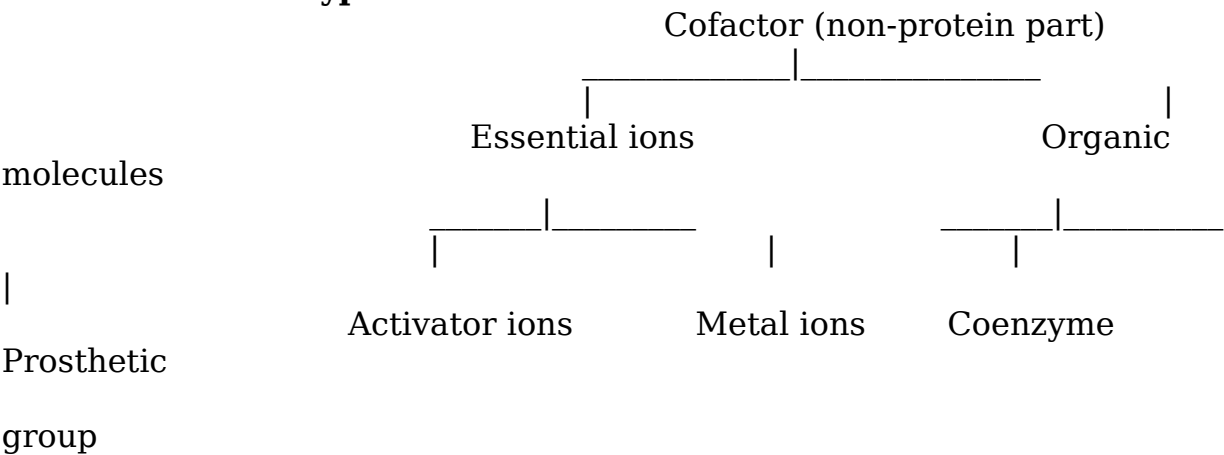
6. **Differences between Competitive and Non-Competitive Inhibitors:**
See Sargodha Board Answer No: 3
7. **Differences between Apoenzyme and Holoenzyme: -**
See Bahawalpur Board Answer No: 5_
8. **The Effect of Concentration of Enzyme on its Activity: -**
See Multan Board Answer No: 4
9. **Low and High Temperatures respectively affecting an Enzyme Activity:**
See Bahawalpur Board Answer No: 8
10. **Irreversible Inhibitors checking the Rate of Reaction: -**
See Multan Board Answer No: 6
11. **Lock and Key Model of Enzyme Action: -**
See Bahawalpur Board Answer No: 7
12. **Active site and its two parts: -**
See Bahawalpur Board Answer No: 6
13. **Inhibitors and give examples: -**
See Multan Board Answer No: 12

Additional SQs from Text Questions

1. Name types of Cofactors.
2. Define substrates.
3. What is metabolic pathway?
4. What is feed back inhibition? What is its importance?
5. Define Catalysis. Describe its mechanism.
6. Where enzymes are located?
7. What is the importance of enzyme in life?
8. What is Activation Energy?
9. Why is inactive form of pepsin produced?
10. What happens when enzymes make mistake in recognition the substrate? Give example.

Answers

1. **Names of Types of Cofactors:**



(loosely bound) (tightly bound) (loosely bound)
(covalently or

tightly bound)

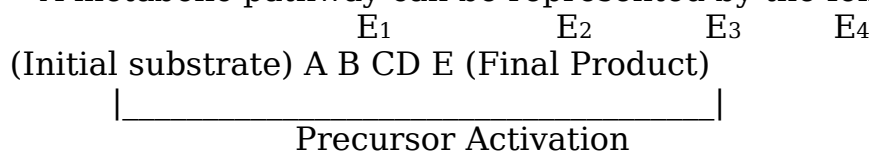
2. Substrates: -

Substrate is a substance that is acted upon by the enzyme. Or
The reactants in an enzymatic reaction are called substrates for that enzyme.

3. Metabolic Pathway:

1. Metabolic pathway is a series of chemical reactions in a particular order.
2. It begins with a particular reactant called initial substrate or precursor and terminate with an end or final product.
3. Many specific steps occur in between initial reactant and final product. One reaction leads to the next reaction, which leads to next reaction and so forth in an organized manner.
4. Successive enzymes (Enzyme 1 (E₁), Enzyme 2 (E₂), Enzyme 3 (E₃) etc) catalyze these specific reactions.

5. A metabolic pathway can be represented by the following diagram.



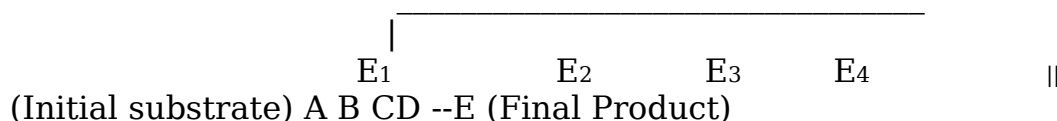
Example: Respiration, Photosynthesis.

4. A) Feedback Inhibition: -

Feed back inhibition is a situation in which the final product of a pathway can inhibit an earlier reaction in a sequence of reactions. Or
In feed back inhibition, an end product of pathway inhibits an earlier reaction.

B) Importance:

When, in enzyme controlled metabolic pathway, the concentration of end product becomes high enough, feed back inhibition operates and lowers the product concentration. Feedback Inhibition



5. A) Catalysis:

Catalysis is the acceleration of the rate of a reaction.

B) Mechanism:

It completes in the following steps:

- i. Binding site of active site recognizes the proper substrate and allows it to bind with the active site forming ES complex.
- ii. ES complex activates the catalytic site of active site that catalyzes the transformation of substrate into product (s).
- iii. Enzyme, after catalysis, detaches itself from the products unchanged and is used again and again.

6. Location of Enzymes:

1. Many enzymes are found dissolved in the cytoplasm.
2. Still many enzymes are found tightly attached to membranes of sub-cellular organelles.
 - i. Enzymes, important in photosynthesis, are found attached to membrane system in the chloroplasts.
 - ii. Enzymes, involved in cellular respiration, are found in the mitochondria.
3. Some enzymes, involved in the synthesis of protein are integral part of ribosome.

7. **Importance of Enzyme in Life:**

To sustain life, biochemical reactions within cells of organisms must occur at extremely rapid rates. This is accomplished by only enzymes. The enzyme catalyzed reactions are 10^3 to 10^{16} faster than corresponding un-catalyzed reactions. The enzymes play a vital role in various metabolic pathways and biosynthesis activities.

Examples: a) Processes of Respiration, Photosynthesis, Muscle Contraction, Digestion etc. all are only possible because of enzymes.
 b) Syntheses of DNA, RNA, Protein, Lipids, Carbohydrates, etc take place under control of different enzymes.

8. **Activation Energy: -**

The energy that must be added to cause molecules react with one another is called Energy of Activation. Or
 Most chemical reactions require an input of energy to get them started. This is referred to as Activation Energy. This energy is used to make the reactants unstable and more likely to react.

9. **Cause of production of Inactive form of Pepsin: -**

Inactive form of pepsin called pepsinogen is produced because its active form, the pepsin, is capable of digesting cell's internal structure and hence walls of the stomach where it is produced. This pepsinogen becomes active into pepsin by HCl in the cavity of the stomach where it can not harm the stomach walls.

10. **Result of Mistake of an Enzyme: -**

When enzymes make mistake in recognition the substrate, they allow the substances similar to substrates called Competitive Inhibitors, to bind and form Enzyme Inhibitor Complexes. No product is formed. Only when the substrate, not inhibitor, is at the active site product will form.

Example: The enzyme Succinic dehydrogenase catalyzes the oxidation of Succinic acid to Fumaric acid. When this enzyme makes mistake and combines with the Malonic acid, having molecular structure similar to Succinic acid, inhibition

happens and no product i.e. Fumaric acid forms

Chapter No: 4 2 SQs
Multan Board
Questions

1. What are Two Models of membrane structure with respect to location of Lipid and Protein? (A-2007)
2. Give role of Mitochondria in cell. (A-2007)
3. Define Polysome. (S-2007)
4. Compare Microtubules with Microfilament. (Model Paper-2006-08)
5. What are Polysomes? (Model Paper-2006-08)
6. What is the function of Parenchymatous cell? (A-2008)
7. Provide three functions of Smooth Endoplasmic Reticulum. (A-2008)
8. Write a note on Peroxisomes. (S-2008)
9. What are silent features of Cell Theory? (S-2008)
10. Write down the functions of Rough ER. (S-2008)
11. What is Selectively Permeable Membrane? (A-2009)
12. Differentiate between Phagocytosis and Pinocytosis? (A-2009)
13. Define Cell Theory. (S-2009)
14. What is Unit Membrane Model of Plasma Membrane? (S-2009)
15. What is Tay Sach's disease? (S-2009)
16. What are Storage Diseases? Name two Storage Diseases in man. (A-2010)
17. Name four proteins present in the cytoskeleton. (A-2010)
18. Write any two silent features of Cell Theory. (A-2010)
19. State silent features of Cell Theory. (S-2010)
20. Give chemical composition Secondary Cell Wall. (S-2010)
21. Give silent features of Cell Theory. (A-2010)
22. Draw the diagram of Fluid Mosaic Model of Plasma Membrane. (A-2010)
23. Differentiate between Pinocytosis and Phagocytosis. (S-2011)
24. What are Peroxisomes? (S-2011)
25. What are Storage Diseases? Name two Storage Diseases in man. (A-2012)
26. Enlist two functions of Smooth Endoplasmic Reticulum. (A-2012)
27. Give silent features of Cell Theory. (A-2013-New)
28. Give two functions of Smooth Endoplasmic Reticulum. (A-2013-New)
29. Give silent features of cell theory. (A-2013-Old)
30. What is Secondary Wall? (A-2013-Old)

Answers

1. Two Models of Membrane Structure with respect to location of Lipid and Protein: -
 1. **Fluid Mosaic Model:**
It is currently accepted model of plasma membrane and other cell membranes in which proteins molecules float in a fluid of phospholipid bilayer. Or
The Fluid Mosaic Model proposes that membranes are composed of a lipid bilayer within which protein molecules are embedded. Or
According to Fluid Mosaic Model, lipid bilayer is not sandwiched between two protein layers, instead proteins are embedded in the lipid bilayer in a mosaic manner.
 2. **Unit Membrane Model:**
Unit Membrane Model proposes that plasma membrane is composed of lipid bilayer

sandwiched between two protein layers. This basic structure is found in membranes of all membraneous organelles such as Mitochondria, Chloroplasts, Endoplasmic Reticulum etc.

2. Role of Mitochondria in Cell: -

Mitochondria are the sites of aerobic cellular respiration (an oxygen requiring process)

where food energy is converted to usable cellular energy, ATP hence it is called Power

House of Cell. Or

Mitochondria contain a large nunumber of enzymes, coenzymes and inorganic salts and

are the sites of various metabolic activities such as Fatty Acid Metabolism, Aerobic

Respiration including Kreb’s Cycle etc that convert chemical energy present in certain

foods to ATP.

3. Polysome: -

Polysome, also known as Polyribosome, is a complex consisting of a number of ribosomes

attached to same stretch of m RNA during translation. Or

Several ribosomes become attached to m RNA and translate the same m RNA.This entire

complex is called Polysome or Polyribosome. Or

A group of ribosomes attached to m RNA is known as Polysome.

5. Comparison of Microtubules with Microfilament: -

| Microtubules | Microflament |
|---|--|
| 1. They are thickest filaments of the cytoskeleton. | 1. They are thinnest filaments of the cytoskeleton. |
| 2. They are small, hollow cylinders about 25 nm in diameter and from 0.2-25 um in length. | 2. They are long, extremely thin, flexible, solid fibers about 7 nm in diameter. |
| 3. They are composed of tubulin protein. | 3. They are made of actin protein. |
| 4. They have a role in assembly and disassembly of spindle structure during mitosis. | 4. They are involved in internal cell motion. |

6. The function of Parenchymatous Cell: -

The function of Parenchymatous Cell is to store surplus food. Or
Some parenchymatous cells carry on photosynthesis and other store the products of

photosynthesis. Or

They store food and water.

7. Three functions of Smooth Endoplasmic Reticulum: -

1. SER helps in metabolism of a number of different types of molecules particularly lipids.

2. They also help to detoxify the harmful drugs.

3. SER is responsible for transmission of impulses e.g. muscle cells, nerve cells.

Or

1. In the liver cells the enzymes of SER are involved in the detoxification of drugs (including amphetamines, morphine, codeine and Phenobarbital). The cells then convert

these compounds to water soluble products that it excretes

2. SER is the primary site of phospholipids, steroid and fatty acid metabolism.

3. SER also form vesicles that transport molecules to other parts of the cell, notably the Golgi apparatus.

8. **Note on Peroxisomes:** -

1. Peroxisomes were first isolated from liver cells by De-Duve and coworkers in 1965.

2. They are single membrane bound enclosed organelles of about 0.5 μm in diameter which contain oxidative enzymes such as peroxidases, catalase, glycolic acid oxidase and some other enzymes.

3. Enzymes of peroxisomes catalyze the removal of electrons and associated hydrogen atoms. Peroxisomes are found in large numbers in cells that synthesize, store, or degrade lipids. Peroxisomes in human liver and kidney cells detoxify certain toxic compounds including ethanol found in alcohol beverages.

4. The name peroxisomes refers to the hydrogen peroxide produced as by product of the activities of the oxidative enzymes. Hydrogen peroxide is dangerous to cells which is immediately broken down into harmless water and oxygen by enzyme catalase.

Or

Peroxisomes are spherical organelles that may contain a large, diamond shape crystal composed of protein. They contain digestive and detoxifying enzymes that produce hydrogen peroxide as a by product.

9. **Silent Features of Cell Theory:** -

1. All organisms are composed of one or more cells.

2. All cells arise from pre-existing cells.

3. Cell is the basic structural as well as functional unit for all organisms.

10. **Functions of Rough ER:** -

They are involved in the synthesis of proteins which are either stored in the cytoplasm or

exported out of the cell through these channels.

Or

Rough ER are involved in manufacturing proteins for export.

The protein is first synthesized on the surface of rough ER by ribosomes attached to it

which enters into the lumen of rough ER where it is modified or folded into final shape

and is then exported by transport vesicles to Golgi complex, lysosomes, vacuoles or

embedded in the plasma membrane.

11. Selectively Permeable Membrane: -

1. Selectively Permeable Membrane means that a membrane will allow certain molecules to pass across it and prevent passage of others.
2. Biological membranes are selectively permeable membranes that allow some but not all substances to pass through them.
3. In response to varying environmental conditions or cell needs, a membrane may be a barrier to a particular substance at one time and actively promotes its passage at another time. Whether a molecule is able to pass through the membrane also depends on its size, electric charge, and solubility in the phospholipids membrane.

12. Differences between Phagocytosis and Pinocytosis:

| Phagocytosis | Pinocytosis |
|--|--|
| 1. When the material taken in by endocytosis is large or solid, the process is called Phagocytosis. | 1. When material taken in by endocytosis is liquid or dissolved, the process is called Pinocytosis. |
| 2. Phagocytosis can be seen with the light compound microscope. | 2. Electron microscope must be used to observe pinocytosis. |
| 3. Phagocytosis is common in unicellular organisms such as Amoeba. It also occurs in humans. In humans this is the process that leucocytes or white blood cells use to surround invading bacteria, viruses and other foreign materials and is a necessary and preliminary step toward the development of immunity. | 3. Blood cells, cells that line the kidney tubules or the intestinal walls all use pinocytosis to ingest substances. |
| 4. During phagocytosis, folds of the plasma membrane enclose the particle which is bound to the surface of the cell, forming a large membraneous sac or vacuole. The vacuole then fuses | 4. In pinocytosis tiny droplets of fluid are trapped by folds in plasma membrane which pinch off into the cytosol into tiny vesicles. The liquid contents of these vesicles are then slowly transferred into the cytosol, the vesicles become progressively smaller. |

| | |
|---|--|
| with lysosomes and the ingested material is degraded. | |
|---|--|

13.

Cell Theory: -

Cell Theory states that all living organisms are composed of cells and cell products.
14.

Unit Membrane Model of Plasma Membrane: -

Unit Membrane Model proposes that plasma membrane is composed of lipid bilayer sandwiched between two protein layers. This basic structure is found in membranes of all membraneous organelles such as Mitochondria, Chloroplasts, Endoplasmic Reticulum etc.
15.

Tay Sach’s disease: -

Tay Sac’s disease is a storage disease in which lipids are accumulated in the brain cells, due to absence of an enzyme in the lysosome that is involved in the catabolism of lipids, which lead to mental retardation and even death.

Or

In Tay-Sachs disease, the missing enzyme digests a fatty substance that helps insulate nerve cells and increases their efficiency. Because the enzyme is missing, this fatty substance in brain cells fails to break down properly and accumulates in lysosomes which swell and cause nerve cells to malfunction. Affected child appears normal at birth but begins to develop neurological problems at four to six months of age. Eventually the child suffers cerebral degeneration, slow parlysis, blindness and loss of motor function.

Children with Tay-Sacs disease live only about three to four years.
16.

A) Storage Diseases: -

Congenital diseases of humans characterized by the deficiency of a lysosomal enzyme and corresponding accumulation of undegraded substances are called Lysosomal Storage Diseases. Over 30 such diseases have been reported.

Or

Storage Diseases are genetic diseases produced by mutation in which one of the normally present digestive enzymes is absent that leads to storage of undigested products in lysosome causing swelling of the organelles and irreversible damage to the cells and tissues.

Or

Several congenital diseases have been found to due to accumulation of substances such as glycogen or various glycolopids. These are called storage diseases and are produced by a mutation that affect one of the lysosomal enzymes involved in the catabolism of a certain substance.

B) Two Storage Diseases in Man: -

1. Glycogenosis type II

2. Tay-Sachs Disease

- 17. Four proteins present in the cytoskeleton: -**
 1. Actin
 2. Tubulin
 3. Myosin
 4. Tropomyosin
- 18. Any two silent features of Cell Theory: -**
 1. All organisms are composed of one or more cells.
 2. All cells arise from pre-existing cells.
- 19. Silent features of Cell Theory: -**
 See Multan Board Answer No: 9
- 20. Chemical Composition of Secondary Cell Wall:**
 Chemically, secondary cell wall is composed of cellulose, inorganic salts, silica, waxes, cutin, legnin etc. Or
 Secondary Cell Wall mainly consists of cellulose or varying mixture of cellulose and may be modified through the deposition of lignin, cutin, inorganic salts, silica and waxes.
- 21. Silent features of Cell Theory: -**
 See Multan Board Answer No: 9
- 22. Diagram of Fluid Mosaic Model of Plasma Membrane: -**
- 23. Differences between Pinocytosis and Phagocytosis: -**
 See Multan Board Answer No: 12
- 24. Peroxisomes: -**
 See Multan Board Answer No: 8
- 25. Storage Diseases with two examples: -**
 See Multan Board Answer No: 8
- 26. Two functions of Smooth Endoplasmic Reticulum: -**
 1. SER is the primary site of phospholipids, steroid and fatty acid metabolism.
 2. SER also form vesicles that transport molecules to other parts of the cell, notably the Golgi apparatus.
- 27. Silent Features of Cell Theory: -**
 See Multan Board Answer No: 9
- 28. Two functions of Smooth Endoplasmic Reticulum: -**
 See Multan Board Answer No: 26
- 29. Silent features of cell theory: -**

30. Secondary Wall: -

Secondary wall is formed on the inner surface of primary wall and is comparatively thick and rigid. Chemically secondary cell wall is composed of cellulose, inorganic salts, silica, waxes, cutin, legnin etc. Or
Secondary cell wall is formed inside the primary cell wall. It has a greater quantity of cellulose fibrils than the primary wall and layers of cellulose fibers are laid down at right angle to one another. Lignin, cutin, inorganic salts, silica and waxes are common ingredient of secondary walls in woody palnts.

Bahawalpur Board
Questions

1. What are silent features of Cell Theory? (A-2007)
2. What is the function of Smooth Endoplasmic Reticulum (SER)? (A-2007)
3. How do Cisternae differ from Cristae? (A-2008)
4. Name different types of Plastids. (A-2008)
5. Give the function of Parenchymatous Cells and Sclerenchymatous Cell in Plants. (A-2009)
6. What is Polysome? (A-2009)
7. What is Cytosol? (A-2009)
8. State the function of Rough Endoplasmic Reticulum. (A-2010)
9. Write the function of Nuceolus. (A-2010)
10. Differentiate between Prokaryotic and Eukaryotic Cell. (A-2010)
11. Give three functions of Smooth Endoplasmic Reticulum. (A-2010)
12. Differentiate between Primary and Secondary Cell Wall. (A-2010)
13. Differentiate between Resoluion and Magnification of Microscope. (A-2011)
14. What is Tay-Sach's Disease? (A-2011)
15. Define Pinocytosis. (A-2012)
16. What is Murein? (A-2012)
17. What is Stroma? (A-2012)
18. What are Thylakoids? (A-2012)
19. Give Silent features of Cell Theory. (A-2013)
20. What is Stroma in the Chloroplast? Give its functions. (A-2013)

Answers

1. Silent Features of Cell Theory: -

See Multan Board Answer No: 9

2. Function of Smooth Endoplasmic Reticulum (SER): -

See Multan Board Answer No: 7

3. Differences between Cisternae and Cristae: -

| Cisternae | Cristae |
|--|--|
| 1. Cisternae are flattened membrane bound sacs in the Endoplasmic Reticulum as well as in Golgi complex. | 1. Cristae are folds of inner membrane that extend into the matrix of mitochondrion. |
| 2. Cisternae contain | 2. Locted on the surface of the |

| | |
|--|--|
| <p>enzymes that are involved in the detoxification of various chemicals , metabolism of lipids and various modifications of proteins</p> <p>3. Their terminal prtion is pinched off and forms transport vescles that transport materials from ER to Golgi complex and from Golgi complex to lysosome or cell membrane.</p> <p>4. They do not have F₁ particles.</p> | <p>cristae are particular enzymes involved in aerobic cellular respiration.</p> <p>3. They do not pinch off in transport vesicles.</p> <p>4. The inner surface of cristae has small knob like F₁ particles.</p> |
|--|--|

4.

Names of different types of Plastids: -

1. Chloroplasts

2. Chromoplasts

3. Leucoplasts
5.

A) Function of Parenchymatous Cells in Plants: -

The function of Parenchymatous Cell is to store surplus food.

B) Function of Sclerenchymatous Cell in Plants: -

Sclerenchymatous cells give support to parts of the plant.
6.

Polysome: -

See Multan Board Answer No: 4
7.

Cytosol: -

1. Cytosol literally means cell solution in which the organelles reside..

2. It is fluid matrix of cell enclosed by cell membrane.

3. It is a watery solution of salts, sugar, amino acids, proteins, fatty acids, nucleotides,

and other materials.

Or

1. Soluble part of the cytoplasm is called Cytosol.

2. It forms the ground substance of the cytoplasm.

3. Chemically it is composed of 90 % water.

4. It forms a solution containing all fundamental molecules of life.

5. In the cytosol small molecules and ions may form true solution and some large molecules form colloidal solution.

Or

It is the soluble fluid component of the cytoplasm in which the organelles are suspended.
8.

Function of Rough Endoplasmic Reticulum: -

See Multan Board Answer No:10
9.

Function of Nucleolus: -

A nucleolus is a site of ribosome manufacture.

Or

A nucleolus is the site where a type of RNA called ribosomal RNA (rRNA) is produced

and where rRNA joins with proteins to form subunits of ribosomes.

Or

A nucleolus is a region where extensive synthesis of ribosomal RNA takes place and where
- 172

ribosomes are assembled and are then exported to the cytoplasm via nuclear pores

It assembles ribosomes. Or

It plays an important role in the synthesis of ribonucleic acid (rRNA) and ribosomes.

10. Differences between Prokaryotic and Eukaryotic Cell: -

| Prokaryotic Cell | Eukaryotic Cell |
|--|---|
| 1. Cell is smaller than eukaryotic cell. | 1. Cell is larger than prokaryotic cell. |
| 2. DNA is not separated from the cytoplasm by a membrane. | 2. DNA is bound within nucleus with a membrane separating it from the cytoplasm. |
| 3. DNA is not packaged into chromosome. | 3. DNA is wound tightly around proteins and packaged into compact units called chromosomes. |
| 4. It is characterized by few membraneous organelles. | 4. It has highly organized membrane bound organelles. |
| 5. Cytoskeleton is absent in prokaryotic cell. | 5. It is supported by internal protein cytoskeleton. |
| 6. It has small sized ribosome of 70 S. | 6. It has large sized ribosomes of 80 S. |
| 7.. The cell wall of prokaryotic cell is composed of peptidoglycan which consists of a carbohydrate matrix (polymers of sugar) that is cross-linked by short polypeptide chains. | 7. Cell wall, if present, consists of either cellulose or chitin. |

11. Three functions of Smooth Endoplasmic Reticulum: -

See Multan Board Answer No:7

12. Differences between Primary and Secondary Cell Wall: -

| Primary Cell Wall | Secondary Cell Wall |
|--|--|
| 1. All plants have a primary cell wall. | 1. Only woody plants have a secondary cell wall. |
| 2. It has less quantity of cellulose fibrils than secondary wall. | 2. It has a greater quantity of cellulose fibrils than primary wall. |
| 3. It lacks lignin. | 3. Lignin, a substance that adds strength, is found in secondary wall. |
| 4. It is laid down on the border of middle lamella when cell is still growing. | 4. It is deposited inside the primary wall of fully expanded cells. |

13. Differences between Resoluion and Magnification of Microscope: -

| Resolution of Microscope | Magnification of Microscope |
|--|---|
| 1. Resolution power or Resolving power of microscope is defined as the minimum distance between two points at which they can both be seen separately by a microscope rather than a single blurred point. | 1. Magnification is a means of increasing the apparent size of the object. Or It is the ratio of the size of the image seen with microscope to the actual size of the object. |
| 2. Resolution power depends on the quality of the lenses and the wavelength of the illuminating source. | 2. Magnification of a microscope is calculated by multiplying the power of its eye piece lense with magnifying power of its objective lense. |
| 2. Resolution of a type of microscope remains the same. | 3. Magification power of a microscope changes by changing the lens of eye piece, objective lense or both. |

14. Tay-Sach’s Disease: -
See Multan Board Answer No:15

15. Pinocytosis: -

1. When material taken in by endocytosis is liquid, the process is called Pinocytosis.

Or

It is a type of endocytosis by which cells engulf and absorb droplets of liquids.

Or

It is the process of liquid uptake by endocytosis in a cell.

Or

It is a process by which a cell engulf some molecules dissolved in water.

2. It is also known as cell drinking.

3. Electron microscope must be used to observe pinocytosis.

4. In pinocytosis tiny droplets of fluid are trapped by folds in plasma membrane which pinch off into the cytosol into tiny vesicles. The liquid contents of these vesicles are then slowly transferred into the cytosol, the vesicles become progressively smaller.

5. Blood cells, cells that line the kidney tubules or the intestinal walls all use pinocytosis to ingest substances.

16. Murein: -

The entire cell wall of a prokaryotic cell is regarded as a single huge molecule or molecular complex called Murein which is composed of peptidoglycan consisting of

a carbohydrate matrix (polymers of sugar) cross-linked by short polypeptide chains.

17. Stroma: -
It is a fluid matrix or interior of the chloroplast in which thylakoids and grana are suspended.
Or
It is the region within a chloroplast that has no chlorophyll.
Or
It is a fluid space of the chloroplast enclosed by the chloroplast inner membrane and surrounding the thylakoids. It is the site of the Rections of the Calvin Cycle.

18. Thylakoids: -
Thylakoids are thin flattened membranous sacs in the stroma of chloroplast which contain accessory pigments and electron transport molecules. The outer surface of thylakoid is in contact to stroma and its inner surface encloses intra-thylakoid space or thylakoid lumen.
Or
These are flat disks found in the chloroplast of plants cells that are the site of the light capturing events and light-dependent rections of photosynthesis.
Or
It is an interconnected system of flattened sac like membranous structures inside the chloroplasts.

19. Silent Features of Cell Theory: -
See Multan Board Answer No: 9

20. Stroma in the Chloroplast its Functions: -
See Gujranwala Board Answer No: 7

Dera Ghazi Khan Board
Questions

- 1. How does Peroxisome differ from Glyxysome? (A-2008)
- 2. What is Endocytosis? (A-2008)
- 3. What is Endocytosis? (A-2009)
- 4. State the function of Golgi apparatus. (A-2009)
- 5. What is Cytoskeleton? (A-2009)
- 6. What is Endocytosis? (A-2010)
- 7. Differentiate between Chromoplast and Leucoplast. (A-2010)
- 8. What is Cell Fractionation? (A-2010)
- 9. Describe the structure of Nucleolus. (A-2010)
- 10. Write the main points of Cell Theory? (A-2011)
- 11. Compare Primary Cell Wall with Secondary Cell Wall. (A-2011)
- 12. Give silent features of Cell Theory. (A-2012)
- 13. Differentiate between Phagocytosis and Pinocytosis. (A-2012)
- 14. What are chromoplasts? Give their function. (A-2013)
- 15. Give silent features of cell theory. (A-2013)

Answer

1. Differences between Peroxisome and Glyxysome: -

| Peroxisome | Glyoxisome |
|--|---|
| 1. It is present in yeast, protozoa, higher plant and animal | 1. It is present only in plant seedlings. 2. It is responsible for the |

| | |
|---|---|
| cells. 2. It is responsible for the production and break down of hydrogen peroxide. 3. The enzymes in peroxisome depend on the function of a particular cell. | break down of fatty acid (lipid) into succinate (carbohydrate). 3. The enzymes in glyoxisome only play a role in germination of lipid rich seeds. |
|---|---|

2. Endocytosis: -

1. It is the process in which cell membrane helps to take in material by infolding in the form of vacuole or vesicle. Or
During endocytosis, cells take in substances by vacuole or vesicle formation.

Or
It is the process in which plasma membrane envelopes food particles.
2. Several types of endocytotic mechanisms operate in biological systems, including phagocytosis, pinocytosis, and receptor-mediated endocytosis.

3. Endocytosis: -

See Dera Ghazi Khan Board Answer No: 2

4. Function of Golgi apparatus: -

Golgi apparatus functions in the collection, packaging, and distribution of molecules synthesized at one place in the cell utilized at other location in the cell or outside the cell. It also synthesizes some chemicals by itself to be exported outside the cell.
Or

1. Golgi apparatus is involved in formation of cell secretions.
Or
Golgi apparatus is responsible for preparing individual molecules for transport to the cell membrane so that they can be secreted from the cell.
2. The most important function of this apparatus is to modify the proteins and lipids by adding carbohydrates and converting them into glycoproteins and glycolipids.
3. Golgi apparatus also modifies existing glycoproteins and glycolipids made in the ER (by cleaving a sugar from their sugar chain or modifying one or more of the sugars).
4. It also manufactures certain macromolecules by itself such as polysaccharides or cell plate material in plant cell are Golgi products.
5. In animal cells, the Golgi complex also manufactures lysosomes.
6. It is also the place where particular chemicals (mucus, carbohydrates, glycoproteins, insulin and enzymes) are concentrated prior to their release from cell or distribution within the cell.

5. Cytoskeleton: -

It is a network of protein fibers within the cytoplasm of a eukaryotic cell that maintains

the shape of the cell, anchors its organelles, and is involved in animal cell motility. Or

It is the dynamic internal network of protein fibers within the cytoplasm of a eukaryotic

cell that includes microfilaments, intermediate filaments and microtubules. It gives cells

mechanical strength, shape, their ability to move. It also functions in cell division and in

the transport of materials within the cell. Or

It is a dense network of protein fibers in the cytoplasm of eukaryotic cell that plays

fundamental roles in mitosis, meiosis, cytokinesis, cell wall deposition, the maintenance

of cell shape and cell differentiation. Or

1. Cytoskeleton is the internal framework of eukaryotic cells composed of intermediate filaments, microtubules and microfilaments.

2. It provides the cell with flexible shape, the ability to move through environment, moves molecules internally and respond to environmental changes.

3. The main proteins that are present in the cytoskeleton are tubulin, actin, myosin, tropomyosin and others.

4. Cytoskeleton is dynamic, especially because its protein components can assemble and disassemble as appropriate.

6. **Endocytosis:** -
See Dera Ghazi Khan Board Answer No: 2

7. **Differences between Chromoplast and Leucoplast:** -

| Chromoplast | Leucoplast |
|--|--|
| 1. It is a colored (other than green) pigmented Plastid. | 1. It is a colorless or unpigmented plastid. |
| 2. It is present in the petals of flower and in the ripened fruit. | 2. It is usually found in cells not exposed to light such as under ground parts of the plant. |
| 3. It helps in pollination and dispersal of seeds. | 3. It synthesizes and stores starches and oils in the cells of many seeds, roots, and tubers such as white potatoes. |

8. **Cell Fractionation:** -
Isolation of cellular components to determine their chemical composition is called cell fractionation. Or
Cell fractionation is a technique for purifying organelles.

Or
Following steps are taken in cell fractionation.

1. Cells are broken open mechanically by the action of a homogenizer and motor. The mixture obtained is referred to as cell extract..

2. The cell extract, is subjected to centrifugal force by spinning in a device called

centrifuge at low speed. Centrifugal force separates the extract into two fractions, a sediment at the bottom containing heavy materials such as nuclei and the liquid above sediment containing lighter particles such as mitochondria and chloroplasts.

3. Liquid is poured into fresh tube and is subjected into differential centrifugation at high speed to obtain a sediment that contains the next heaviest cell components.

4. Cell components in the resuspended sediment are further purified by density gradient centrifugation.

5. Some cellular organelles, which require high speed for separation, are purified by ultracentrifugation.

6. Various cell fractions can then be biochemically analysed.

9. **Structure of Nucleolus: -**

Each nucleolus contains a nuclear organizer made up of chromosomal regions containing instructions for making the type of RNA in ribosomes. Or

Nucleolus is composed of two regions, peripheral granular area composed of precursors of ribosomal sub-units and the central fibrill consisting of large molecular weight RNA and r DNA.

10. **Main points of Cell Theory: -**

1. All organisms are composed of one or more cells, and the life processes of metabolism and heredity occur within these cells.
2. Cells are the smallest living things, the basic units of organization of all organisms.
3. Cells arise only by division of a previously existing cell.

11. **Comparison of Primary Cell Wall with Secondary Cell Wall: -**

See Bahawalpur Board Answer No: 11

12. **Silent features of Cell Theory: -**

1. All organisms are composed of cells.
2. Cells come only from pre-existing cells.
3. Cells are basic units of structure and function in organisms.

13. **Difference between Phagocytosis and Pinocytosis:**

See Multan Board Answer No: 11

14. **A) Chromoplasts: -**

Chromoplasts are the plastids that contain pigments such as xanthophyll, carotene which are present in the petals of flower and in the ripened fruit.

B) Function of Chromoplasts: -

1. The chromoplasts are responsible for various color combinations found in flowers, fruits and other colored parts except green.
2. They help the flowers to attract animals that serve as pollinators and as seed dispersers.

15. **Silent features of cell theory: -**

See Multan Board Answer No: 9

Lahore Board

Questions

1. Write down the silent features of Cell Theory. (A-2006)
2. What is Stroma in a Chloroplast? (A-2007)
3. What is Fluid Mosaic Model of Cell Membrane? (A-2007)
4. What is Lysosome? Give its function. (A-2008)
5. Write the chemical composition of Primary and Secondary Cell Wall. (A-2008)
6. Define Fluid Mosaic Model of Plasma Membrane. (A-2009)
7. Differentiate between Peroxisome and Glyoxisome. (A-2009)
8. What are two subunits in Ribosomes and how their attachment is controlled? (A-2009)
9. Give two functions of Cytoplasm. (A-2010)
10. How outer and inner membranes of Mitochondria differ from each other? (A-2010)
11. Compare Microtubules and Microfilaments. (A-2011)
12. Define Semipermeable Membrane. (A-2011)
13. Who stated "*Omnis Cellula e Cellula*", what does it mean? (A-2012)
14. Who discovered Cell Theory? (A-2012)
15. Differentiate between Phagocytosis and Pinocytosis. (A-2012)
16. Define Resolution of Eye. (A-2012)
17. What is meant by cell fractionation? (Group-I-A-2013)
18. Differentiate between chromoplasts and leucoplasts. (Group-I-A-2013)
19. Give the functional differences between Sclerenchymatous and Parenchymatous cells. (Group-II-A-2013)
20. What is differentially permeable membrane? (Group-II-A-2013)

Answers

1. **Silent features of Cell Theory:** -
See Multan Board Answer No: 9
2. **Stroma in a Chloroplast:** -
See Bahawalpur Board Answer No: 17
3. **Fluid Mosaic Model of Cell Membrane:** -
According to Fluid Mosaic Model, lipid bilayer is not sandwiched between two protein layers, instead proteins are embedded in the lipid bilayer in a mosaic manner.
4. **A) Lysosome:** -
Lysosome is a membrane bounded vesicles produced by the Golgi apparatus. It has very low pH and contains powerful hydrolytic digestive enzymes.
Or
Lysosomes is a spherical body, a few micrometer in diameter, surrounded by a single membrane, originated by Golgi apparatus and containing digestive enzymes. Or
Lysosome is a small sac of digestive enzymes present in cytoplasm of most eukaryotic cells.
B) Functions:
 1. It engulfs any foreign object that gains entry into the cell and breaks it completely into simple digestible pieces, a process is termed as phagocytosis.
 2. It is involved in autophagy (self eating).

3. It releases enzymes for extracellular digestion.

Or

1. It releases enzymes that begin the break down of the contents of damaged cells so that component parts can be used by surrounding cells, a process termed as

autophagy

2. It plays a part in the normal development of an organism. For example, as a tadpole slowly changes into a frog, the cells of tail are destroyed by the action

of lysosome.

3. In many kinds of cells, it is known to combine with food vacuole taking a part

in intracellular digestion.

4. It is used in destruction of engulfed disease causing microorganisms such as

bacteria, viruses and fungi, a process termed as phagocytosis.

5. It also releases enzymes for extracellular digestion.

5. A) Chemical composition of Primary Cell Wall: -

The primary cell wall is chemically composed of cellulose and some deposition of pectin and hemicellulose. Cellulose molecules are in a criss cross arrangement.

B) Chemical Composition of Secondary Cell Wall: -

See Multan Board Answer No: 20

6. Fluid Mosaic Model of Plasma Membrane: -

See Lahore Board Answer No: 3

7. Differences between Peroxisome and Glyoxisome: -

See Dera Ghazi Khan Board Answer No: 1

8. Subunits of Ribosomes and their Attachment: -

Two subunits of ribosomes are larger subunit and smaller subunit. The larger unit is dome-shaped and smaller unit forms a cup on the flat surface of larger subunit. The

larger subunit sediments at 60 S while smaller sub unit sediments at 40 S. Two subunits

attach with each other during protein synthesis forming 80 S particle. This attachment is

controlled by the presence of Mg^{2+} ions. Ribosomes are attached to m RNA through small ribosomal subunit.

9. Two functions of Cytoplasm: -

1. It is the site for certain metabolic processes such as Glycolysis.
2. It acts as a store house of vital chemicals.

10. Differences between Outer and Inner Membranes of Mitochondria: -

| Outer Membrane of Mitochondria | Inner Membrane of Mitochondria |
|---------------------------------------|---|
| 1. Outer membrane is smooth. | 1. Inner membrane is highly folded. |
| 2. No crista is formed by it. | 2. The tightly packed inward folds of inner membrane are called |
| 3. It lacks F ₁ particles. | |

| | |
|---|---|
| <p>4. Outer membrane consists mostly of phospholipids, considerable amount of cholesterol and some amount of protein.</p> <p>5. Proteins (enzymes) in the outer membrane carry out various reactions in the fatty acid metabolism and phospholipid biosynthesis and are responsible for some oxidation reactions.</p> <p>6. It allows many small molecules to pass through it freely. Or Outer membrane is freely permeable to molecules of molecular weight 10000.</p> | <p>Cristae.</p> <p>3. Knob like F1 particles are embedded in the folds of inner membrane.</p> <p>4. Inner membrane is very rich in proteins and has less amount of lipid.</p> <p>5. Most of oxidative reactions occur on inner membrane.</p> <p>6. It strictly regulates the types of molecules that can move across it and is virtually impermeable to polar and ionic substances.</p> |
|---|---|

11.

Comparison of Microtubules and Microfilaments: -
See Multan Board Answer No: 5
12.

Semipermeable Membrane: -
Semipermeable membranes are the membranes that allow certain molecules to pass across it and prevent passage of others.
13.

Person and meanings of statement of “*Omnis Cellula e Cellula*”:
Rudolf Virchow stated “*Omnis Cellula e Cellula*”. It means that, new cells are formed from pre-existing living cells.
14.

Persons who discovered Cell Theory:
Theoder Schwann (German Zoologist) and Schleiden (German Botanist) discovered Cell Theory.
15.

Differences between Phagocytosis and Pinocytosis: -
See Multan Board Answer No: 11
16.

Resolution of Eye: -
The human eye can differentiate between two points which are atleast 1.0 mm apart. This is known as Resolution of Eye. Or
Resolution of Eye is the minimum distance between two points that can still be seen or resolved by human nacked eye as two separate points. The resolution of average human eye is set at 1.0 mm.
17.

Cell Fractionation: -

See Dera Ghazi Khan Board Answer No: 8

18. Differences between Chromoplasts and Leucoplasts: -

See Dera Ghazi Khan Board Answer No: 7

19. Functional Difference between Sclerenchymatous and Parenchymatous Cells: -

| Sclerenchymatous Cells | Parenchymatous Cells |
|--------------------------------|-----------------------------|
| They give support to the cell. | They store surplus food. |

20. Differentially Permeable Membrane: -

See Gujranwala Board Answer No: 5

Gujranwala Board Questions

1. What are Peroxisomes? (A-2006)
2. Differentiate between Chromoplast and Leucoplast. (A-2006)
3. What is Endocytosis? (A-2007)
4. Is there any similarity between Bacterial and Plant Cell Wall? (A-2007)
5. Write note on differentially permeable membranes. (A-2008)
6. Explain the role of Nucleoli in the Cell. (A-2008)
7. What is Stroma? Give its function. (A-2008)
8. Differentiate the chemical compositions of Primary and Secondary Plant Cell Wall. (A-2009)
9. What is Cell Fractionation? (A-2009)
10. Differentiate F1 particles from Cristae. (A-2009)
11. How Mitochondria are Power House of Cell? (A-2010)
12. Write down the role of Centrioles. (A-2010)
13. Write down silent features of Cell Theory. (A-2011)
14. Define Polysomes. (A-2011)
15. Write silent features of Cell Theory. (A-2012)
16. Write a note on Cytoskeleton. (A-2012)
17. What is chemical composition of Plasma Membrane? (A-2013)
18. How magnification power of a compound microscope is determined? (A-2013)

Answers

1. Peroxisomes: -

See Multan Board Answer No: 8

2. Differences between Chromoplast and Leucoplast: -

See Dera Ghazi Khan Board Answer No: 7

3. Endocytosis: -

See Dera Ghazi Khan Board Answer No: 2

- 4.** Yes, following similarities are found between bacterial and plant cell wall:
- a. Both do not act as barriers to materials passing through it.
 - b. Both, cellulose found in plant cell wall and polysaccharide as a constituent of peptidoglycan present in the bacterial cell wall, are carbohydrate.
 - c. Both are non-living.

5. Note on Differentially Permeable Membranes: -

Differentially (Selectively) Permeable Membrane means that certain substances can move

across the membrane while others can not.

The Plasma Membrane is differentially mermeable. Certain substances can freely pass through the membrane, and others can not. Moreover in response to varying environmental conditions or cell needs, a membrane may be a barrier to a particular substance at one time and actively promote the passage at another time.

6. **Role of Nuceoli in the Cell:** -
See Bahawalpur Board Answer No: 9

7. **A) Stroma:**
It is a fluid matrix or interior of the chloroplast in which thylakoids and grana are suspended.

B) Function of Stroma:
It is the site where carbon is fixed and reduced resulting in the synthesis of sugar during the dark reactions of photosynthesis. Or
It is the site of the Rections of the Calvin Cycle.

8. **Difference between the chemical compositions of Primary & Secondary Cell Wall:** -

| Chemical Composition of Primary Cell Wall | Chemical Composition of Secondary Cell Wall |
|--|---|
| 1. Chemically it is composed of cellulose and some deposition of pectin and hemicellulose. | 1. Chemically it is composed of inorganic salts, silica, waxes, cutin and lignin. |
| 2. It has less quantity of cellulose fibrils than secondary wall. | 2. It has a greate quantity of cellulose fibrils than primary wall. |
| 3. It lacks lignin. | 3. Lignin, a substance that adds strength, is found in secondary wall. . |

9. **Cell Fractionation:** -
See Dera Ghazi Khan Board Answer No: 8

10. **Difference between F1 particles and Cristae:** -

| F1 Particles | Cristae |
|--|--|
| 1. They are knob-like structures embedded in the inner surface of cristae in the mitochondrial matrix. | 1. They are folds of inner membrane that extend into the matrix of mitochondria. |
| 2. They transfer phosphate to ADP. | 2. They are involved in the oxidative reactions. |

11. **Mitochondria as Power House of Cell:** -
Mitochondria are called Power Houses of Cell because they produce most of the ATP used by the cell through cellular respiration. Or
Mitochondria are called Power Houses of Cell

where energy in the form of ATP is produced, stored and released wherever, and whenever required by a living body.

12. Role of Centrioles: -

2. Centrioles play important role in the location of furrowing during cell division.
3. Centrioles help assemble the animal cell's microtubules. Or Centrioles are duplicated before cell division and may play a role in some types of microtubule assembly.
4. Centrioles play a role in the formation of cilia.
5. They give rise to the basal bodies of cilia and flagella.

13. Silent Features of Cell Theory: -

See Multan Board Answer No: 9

14. Polysomes: -

See Multan Board Answer No: 4

15. Silent Features of Cell Theory: -

See Multan Board Answer No: 9

16. A Note on Cytoskeleton: -

1. It is a network of protein fibers within the cytoplasm of a eukaryotic cell.
2. The main proteins that are present in the cytoskeleton are tubulin, actin, myosin, tropomyosin and others.
3. It is cytoskeletal fabric formed of:
 - a. **Microtubule** -Long, slender, tubulin protein structures that are involved in assembly and disassembly of spindle and assembly of cilia, flagella, basal bodies, and centrioles.
 - b. **Intermediate Filaments**--Made up of keratin, vimentin etc proteins with diameter in between microtubules and microfilaments that maintain cell shape.
 - c. **Micrfilaments** More slender cylinders made up of actin protein that are involved in internal cell motion.

17. Chemical Composition of Plasma Membrane: -

Plasma Membrane is chemically composed of:

- i. Proteins 60-80 %
- ii. Lipids 20-40 %
- iii. Carbohydrates Small quantity

18. Magnification Power of a Compound Microscope: -

Magnification power of a compound microscope is determined by multiplying X values of ocular lense and X value of objective lense.
For example, a microscope with 10X ocular lense and 40X objective lense will have $(10 \times 40 = 400)$
400 X magnifying power.

Rawalpindi Board
Questions

1. Give the silent features of Cell Theory. (A-2010)
2. What is the composition of chromosome? (A-2010)
3. Enlist two functions of Smooth Endoplasmic Reticulum. (A-2011)
4. What are Storage Diseases? Name two Storage Diseases in Man. (A-2011)
5. Differentiate between phagocytosis and pinocytosis. (A-2013)
6. What is meant by Cytosol and Polysome? (A-2013)

Answers

1. **Silent Features of Cell Theory: -**
See Multan Board Answer No: 9
2. **Composition of Chromosome: -**
Chromosome is composed of DNA and Proteins.
3. **Two Functions of Smooth Endoplasmic Reticulum: -**
See Multan Board Answer No: 26
4. **A) Storage Diseases: -**
See Multan Board Answer No: 16
B) Two Storage Diseases in Man: -
See Multan Board Answer No: 16
5. **Differences between phagocytosis and pinocytosis: -**
See Multan Board Answer No: 11
6. **Cytosol and Polysome: -**
A) Cytosol: -
It is the soluble part of the cytoplasm which forms its ground substance.
B) Polysomes: -
It is a group of ribosomes attached to mRNA.

Sargodha Board Questions

1. Differentiate between Phagocytosis and Pinocytosis. (A-2010)
2. Give the functions of Smooth Endoplasmic Reticulum. (A-2010)
3. What are Thylakoids? (A-2011)
4. Write down functions of Vacuoles. (A-2011)
5. Define Pinocytosis and Endocytosis. (A-2011)
6. What is the role of Centriole? (A-2012)
7. Differentiate between Endocytosis and Exocytosis. (A-2012)
8. Define endocytosis. (A-2013)

Answers

1. **Difference between Phagocytosis and Pinocytosis: -**
See Multan Board Answer No: 11
2. **Functions of Smooth Endoplasmic Reticulum: -**
See Multan Board Answer No: 7
3. **Thylakoids: -**
See Bahawalpur Board Answer No: 18
4. **Functions of Vacuoles: -**

1. Vacoules play a significant role in plant growth and development. A plant cell increases in size by adding water to vacuole.
2. A large central vacuole in plants contains water as well as stored food, salts , pigments and metabolic intermediates.
3. Wastes may be recycled in vacuole or they may aggregate and form crystals inside the vacuole.
5. The plant vacuole is the major contributor to the turgor that provides support to individual plant cell and contributes to the rigidity of the leaves and younger parts of the plants.
6. Most protozoa have food vacuoles, which fuse with lysosomes so that food they contain can be digested.
7. Some types of protozoa also have contractile vacuoles, which remove excess water from the cell.
4. Compounds that are harmful to herbivores may also be stored in some plant vacuoles as a means of defense.

5. **A) Pinocytosis:** -
See Bahawalpur Board Answer No: 15
- B) Endocytosis:** -
See Dera Ghazi Khan Board Answer No: 2

6. **Role of Centriole:** -
See Gujranwala Board Answer No: 12

7. **Differences between Endocytosis and Exocytosis:** -

| Endocytosis | Exocytosis |
|---|---|
| <ol style="list-style-type: none"> 1. In endocytosis, materials are taken into the cell. 2. Plasma membrane forms vesicles or vacuoles. 3. Plasma membrane used in the formation of vacuoles or vesicles is regenerated. 4. Endocytosis is common in unicellular organisms such as Amoeba. Three different types of endocytosis take place in humans to take in the material in solid as well as in fluid form. | <ol style="list-style-type: none"> 1. In exocytosis, materials are exported out of the cell. 2. Vesicles fuse with plasma membrane and becomes its part. 3. This is also the primary mechanism by which plasma membranes grow larger. 4. In animal cells, exocytosis provides mechanism for secreting many hormones, neurotransmitter, digestive enzymes and other substances. In plant cells, it is an important means of exporting materials needed to construct cell wall through the plasma membrane. |

8. **Endocytosis:** -
See Dera Ghazi Khan Board Answer No: 2

Faislabad Board Questions

1. Who formulated Cell Theory finally? (A-2007)
2. What are Plastids? (A-2007)
3. Explain the difference between Microtubules and Microfilament. (A-2007)
4. Write down the role of Cell Wall. (A-2008)
5. Differentiate between Chromoplasts and Leucoplasts. (A-2008)
6. Write two main points of Cell Theory. (A-2009)
7. What are Plastids? Write the names of their two types. (A-2009)
8. What is Autophagy? (A-2009)
9. Compile the silent features of Cell Theory. (A-2010)
10. List the features of Prokaryotic Cell. (A-2010)
11. Differentiate between Pinocytosis and Phagocytosis. (A-2011)
12. Write any four functions of Endoplasmic Reticulum. (A-2011)
13. What do you know about intergranum? (A-2012)
14. Differentiate between phagocytosis and pinocytosis. (A-2013)
15. Give two functions of cytoplasm. (A-2013)

Answers

1. **Persons who Formulated Cell Theory Finally:** -

Thoeder Schwann (German Zoologist) and Schleiden (German Botanist) formulated Cell Theory finally.

2. **Plastids:** -

1. Membrane bounded mostly pigment containing bodies present in the cells are called
Plastids. Or
These are membrane-bounded organelles occurring in photosynthetic eukaryotic cells.
2. Plastids have DNA and ribosomes and are produced by division of existing plastids.
3. Plastids produce and store food materials in cells of plants and algae.
5. There are three types of plastids, e.g. Chloroplast, Chromoplast and Leucoplast.
6. All plastids develop from proplastids, precursor organelles found in less specialized plant cells, particularly in growing undeveloped tissues.
7. Mature plastids can convert from one form to another.

3. **Differences between Microtubules and Microfilament:** -

See Multan Board Answer No: 5

4. **Role of Cell Wall:** -

1. It provides a mechanical support and gives definite shape and protection to the cell.
Or
It protects, supports and gives definite shape to the cell.
2. Being hydrophilic nature, it is capable of imbibing water and thus helps in the movement of water and solutes towards protoplasm.

5. Differences between Chromoplasts and Leucoplasts: -

See Dera Ghazi Khan Board Answer No: 7

6. Two main points of Cell Theory: -

See Multan Board Answer No: 18

7. A) Plastids:

Membrane bounded mostly pigment containing bodies present in the cells are called

Plastids.

B) Names of two types of Plastids: -

1. Chloroplasts
2. Chromoplasts

8. Autophagy: -

1. It is a process in which lysosomes release the enzymes that cause a cell to destroy

itself by digesting its own proteins.

Or

It is a process of self-eating in which parts of the cell are engulfed by primary

lysosomes and digested to generate energy and the primary lysosomes which digest

the parts of their own cells are known as autophagosomes. Or

During autophagy some old and worn out cells such as old mitochondria are digested

by the enzymes of lysosomes.

2. Autophagy is a process which plays an important role in recycling cellular material,

and destroying nonfunctional organelles and portions of cytoplasm.

9. Silent Features of Cell Theory: -

See Multan Board Answer No: 9

10. Features of Prokaryotic Cells: -

1. Prokaryotic Cells are usually very small and include bacteria and cyanobacteria

(blue green algae)

2. Genetic material (DNA) is without any nuclear membrane and is directly submerged in the cytoplasm.

3. They have few membraneous organelles and generally lack many of the membrane

bounded organelles (Mitochondria, Endoplasmic Reticulum, Golgi complex etc) found

in eukaryotic cells.

4. They have small sized ribosomes of 70 S.

5. They lack mitosis and divide by binary fission.

6. They lack Cytoskeleton.

7. The cell wall of prokaryotic cells is composed of peptidoglycan which consists of a

carbohydrate matrix (polymers of sugar) that is cross-linked by short polypeptide chains.

11. Differences between Phagocytosis and Pinocytosis: -

See Multan Board Answer No: 11

12. Any four functions of Endoplasmic Reticulum: -

1. It forms compartments and provides a large surface area upon which chemical

- activities take place. Because the the ER has an enormous surface area, many chemical reactions can be carried in an extremely small space.
2. It participates in protein and lipid synthesis.
 3. It forms vesicles that transport molecules to other parts of the cell, notably the Golgi apparatus.
 4. Endoplasmic Reticulum provides mechanical support to the cell so that its shape is maintained.
- Or
1. It is involved in synthesis of protein.
 2. It plays an important role in the transport of materials from one part of the cell to the other.
 3. It helps in metabolism of different types of molecules particularly lipids.
 4. It helps to detoxify harmful drugs.

13. Intergranum: -

Intergranum is a thylakoid that extends from one granum to another. It is involved in ATP synthesis.

14. Differences between Phagocytosis and Pinocytosis: -

See Multan Board Answer No: 11

15. Two functions of Cytoplasm: -

1. It is the site for certain metabolic processes such as Glycolysis.
2. It acts as a store house of vital chemicals.

Chapter No: 5 1 SQ

Multan Board

Questions

1. Differentiate between Retrovirus and Bacteriophage. (A-2007)
2. How has Small Pox been eliminated from world? (A-2007)
3. Give Biological Classification of the Corn. (S-2007)
4. What do you know about the Capsid of Virus? (Model Paper 2006-08)
5. Draw a labelled diagram of HIV. (Model Paper 2006-08)
6. What sort of terminologies was given by E. Chatton? (A-2008)
7. Give lytic cycle of Phage Viruses. (A-2008)
8. What is Binomial Nomenclature? Explain it briefly. (S-2008)
9. Give classification of viruses due to their morphology. (S-2008)
10. What is Prion? (A-2009)
11. Write four symptoms of AIDS. (A-2009)
12. Write the names of Five Kingdoms. (A-2009)
13. What are Prions? Name two diseases they cause. (S-2009)
14. What is Reverse Transcriptase? (S-2009)
15. What is Prophage? (A-2010)
16. What are POCKS? (S-2010)
17. Define the Reverse Transcriptase. (S-2010)
18. Define Binomial Nomenclature. Write the scientific names of any two organisms. (A-2011)
19. Differentiate between Virion and Prion. (A-2011)
20. What is Prophage? (A-2012)
21. What are Prions? (A-2012)
22. Define Binomial Nomenclature. (A-2013-New)
23. Why viruses are called Obligate Parasite? (A-2013-Old)
24. What is Herpes Simplex? (A-2013-Old)

Answers

1. Differences between Retrovirus and Bacteriophage: -

| Retrovirus | Bacteriophage |
|--|---|
| 1. It infects humans. | 1. It attacks bacteria. |
| 2. It is a single stranded RNA tumor virus. | 2. It is DNA virus. |
| 3. It is spherical in form about 100 nm in diameter. | 3. It is tadpole like with head, collar and tail. |
| 4. It is enveloped by host plasma membrane. | 4. It is non-enveloped virus. |
| 5. It has special enzyme called reverse transcriptase which can convert a single stranded RNA genome into double stranded viral DNA. | 5. It lacks reverse transcriptase enzyme. |

2. Elemination of Small Pox: -
Small Pox has been **eliminated** from **world** by **vaccination**.

3. Biological Classification of the Corn: -
Kingdom Plantae
Division (Phylum) Anthophyta (Tracheophyta)
Class Angiospermae
Order Poales
Family Poaceae
Genus *Zea*
Species *mays*

4. Capsid of Virus: -

1. A surrounding coat or layer of protein that encloses the genom of virus is known as Capsid of Virus. Or
Capsid is a protein sheath around nucleic acid core of virus.

2. The capsid is composed of one to a few different protein molecules repeated many times.

2. Generally, capsid is subdivided into individual protein subunits called Capsomeres.
The number of capsomeres is characteristic for a particular virus.

2. The capsid protects the genome because the chemical construction of capsid amino acids resists temperature, pH, and other environmental fluctuations.

3. It also gives shape to the virus and is responsible for the helical, icosahedral, or complex symmetry.

4. In some viruses, specialized enzymes are stored within the capsid that assist cell penetration during the replication process.

5. Capsid is the structure that stimulates an immune response during periods of disease.

5. Labelled diagram of HIV: -

6. Sort of terminologies was given by E. Chatton: -

E. Chatton gave following terminologies.

1. Procariotic (from Greek *pro*, meaning before, and *karyon*, meaning nucleus) for bacteria and blue green algae.
2. Eucariotic (from Greek *eu*, meaning true and *karyon*, meaning nucleus) for animal and plant cells.

7. Lytic Cycle of Phage Viruses: -

Lytic Cycle of Phage Viruses can be explained in the following steps.

1. The virus attaches to receptors on the host cell wall.
2. Phage DNA enters the bacterial cell.
3. Phage DNA takes the control of bacterial DNA and bacterial biosynthetic machinery.
4. Phage DNA is replicated and phage proteins are synthesized.
5. Phage components (DNA, proteins) are assembled into mature viruses.
6. The bacterial cell lyses and releases many phages that can then infect other bacterial cells.

8. Binomial Nomenclature: -

It is a naming system introduced by Linnaeus that uses two Latin names, generic name and

specific name for each species of organisms. Or

Binomial Nomenclature is a system of giving each species a scientific name comprising

two words. The first word belongs to genus of the organism and is called generic name, the

first letter of generic name is capitalized and remainder is written in small letters. The

second word refers to one species within that genus and is known as specific name which is

written in small letters. Both words should be printed in italics but if this is not possible,

they should be underlined.

Examples: The scientific name for human being is *Homo sapiens* and for onion is

Allium cepa.

9. Classification of viruses due to their morphology:

Due to morphology viruses are classified into:

1. Rod-shaped (e.g. TMV)
2. Spherical (e.g. Polio)
3. Tadpole like (e.g. Bacteriophages)

10. Prion: -

1. Prion is described as proteinaceous infectious particles thought to cause a number of Diseases.

2. Prion was named by Stanley B. Prusiner, a leading researcher in prion study.

3. It is composed of protein only that contains the information coding for its own replication.

4. It is responsible for mad cow infection and mysterious brain infection in man.

11. Four Symptoms of AIDS: -

1. Symptoms of First Stage of AIDS:
Fever, diarrhea, rash, lymphadenopathy (swelling of lymph nodes), night-sweats and general fatigue
 2. Symptoms of Second Stage of AIDS:
Asymptomatic
 3. Symptoms of Third Stage of AIDS:
Generalized lymphadenopathy (swelling of lymph nodes) greater than six months in two or more areas of their bodies
 4. Symptoms of Fourth Stage of AIDS:
Symptoms of AIDS include immunodeficiency due to loss of helper T-lymphocytes, pathological changes in the spinal cord, a special type of skin cancer and development of opportunistic diseases and death.
- Or
- Symptoms of AIDS include:
1. Rare Vascular cancer
 2. Sudden weight loss
 3. Swollen lymph nodes
 4. General loss of immune function.

12. Names of Five Kingdoms: -

1. Prokaryotae
2. Fungi
3. Protocista
4. Plantae
5. Animalia

13. A) Prions: -

1. Prions are infectious protein particles which can be passed from one individual to another
2. Prions cause several kinds of brain diseases that cause changes in the brain resulting in spong appearance to the brain called spongiform encephalopathies.
3. They do not reproduce or replicate as do viruses. The multiplication of the prion appears to result from the disease-causing prion protein coming in contact with a normal body protein and converting it into disease causing form. When this conversion happens to a number of proteins, they stack up or interlock and form patches of protein on the surface of nerve cells disrupting flow of nerve impulse causing nerve cell death.

B) Two Diseases Caused by Prions: -

- a. **Mad Cow Infection or Bovine Spongiform Encephalitis or BSE: -**
 - i. This disease occurred in Britain
 - ii. This disease was caused by spread of prions from sheep to cattle.
 - iii. This occurred because of practice of processing unusable parts of sheep carcasses into a protein supplement that was fed to cattle.
- b. **Mysterious Brain Infection in Man or Creutzfeldt-Jacob Disease or CJD: -**
 - i. It is found throughout the world.

corneal
affected to
ii. Contaminated surgical instruments and tissue transplant such as
transplant are the most likely causes of transfer of proins from
uninfected persons.

14. Reverse Transcriptase: -
It is an enzyme that synthesizes a DNA molecule from the code supplied by an RNA molecule.
Or
Reverse transcriptase is a DNA polymerase enzyme produced by retroviruses that catalyzes the production of DNA using RNA as template.
Or
It is an enzyme in retroviruses which carries out RNA→ DNA transcription.
This DNA is single stranded DNA. Using host enzyme this DNA becomes double-stranded DNA.
Or
Reverse transcriptase is an enzyme found in retroviruses which uses the viral RNA as a template to synthesize single stranded DNA (the term reverse transcriptase is derived from this reversal of usual biochemistry). Once formed, the single stranded DNA serves as template to form a double stranded DNA. It often makes mistakes and so introduces mutation.

15. Prophage: -
It is a fragment of viral DNA integrated into bacterial chromosome.
Or
The viral DNA that becomes incorporated into bacterial DNA and becomes latent but replicates as bacterial DNA replicates is called Prophage.
Or
The viral genome that is incorporated into the bacterial DNA is referred as Prophage. Or
Prophage is a set of bacteriophage genes inserted to a bacterial chromosome.

16. POCKS: -
1. They are pitted scars in the skin of the persons affected by small pox (Variola).
2. They are formed by bursting of pustules or pus lesions.
3. They are generally smaller than the lesions of syphilis (the Great Pox) or varicella (Chicken Pox).

17. Reverse Transcriptase: -
See Multan Board Answer No: 14

18. Binomial Nomenclature with scientific names of any two organisms: -
See Multan Board Answer No: 8

19. Differences between Virion and Prion: -

| Virion | Prion |
|--|--|
| 1. It is a complete assembled virus | 1. It is disease causing form of protein. |
| 2. It consists of nucleic acid (DNA or RNA) and a protein. | 2. It consists only of infectious protein particles. |
| 3. It reproduces by | 3. It does not reproduce by |

| | |
|--|---|
| <p>replication.</p> <p>4. It is usually synonymous with virus that infects animals, plants or bacteria and causes a variety of diseases.</p> | <p>replication. The multiplication of the prion appears to result from the disease-causing prion protein coming in contact with a normal body protein and converting it into disease causing form now called prion.</p> <p>4. It is the least understood organism which causes several kinds of brain diseases.</p> |
|--|---|

20.

Prophage: -

See Multan Board Answer No: 15
21.

Prions: -

See Multan Board Answer No: 10 or 13
22.

Binomial Nomenclature: -.

See Multan Board Answer No: 8
23.

Viruses as Obligate Parasites: -

Viruses are called Obligate Parasite because they can reproduce only in animal and plant cells or microorganisms by replication. They can not be grown on artificial media.
24.

Herpes Simplex: -

It is a viral disease of the skin and nervous system, often characterized by bristle like sores.

Or

 - Herpes Simplex is a collection of viral diseases all caused by large DNA virion.
 - Virion has icosahedral symmetry and an envelope with spikes.
 - Its virus belongs to family Herpesviridae.
 - Herpes simplex is naturally occurring disease of mankind.
 - This disease is characterized by cold sores (fever blisters), the unsightly lesions in the epithelial layers of ectodermal tissues, that form on lips, gums, nose and adjacent areas.

- Bahawalpur Board

Questions

 - What are Retroviruses? (A-2007)
 - Define Hepatitis. What are its types? (A-2007)
 - Name different types of Virus (A-2008).
 - Define Binomial Nomenclature. (A-2008)
 - What is Poliomyelitis? (A-2009)
 - What is Hepatitis? Which Hepatitis is called Serum Hepatitis? (A-2009)
 - Why virus are said to be Obligate Intracellular Parasite? (A-2010)
 - How are viruses classified? (A-2010)
 - Draw diagram of Bacteriophage and label it. (A-2011)

10. Why some biologists found Two Kingdom Classification unworkable? (A-2011)
11. Differentiate between Retrovirus and Bacteriophage. (A-2012)
12. How has Small Pox been eliminated from the world? (A-2012)
13. Differentiate between Capsids and Capsomeres. (A-2013)

Answers

1. **Retroviruses: -**

Retroviruses are the single stranded RNA tumor viruses which have a special DNA polymerase enzyme called reverse transcriptase that uses RNA as a template to synthesize DNA for incorporation to the cell's nucleic acid. Or They are spherical, enveloped, single stranded RNA viruses which have special enzyme called reverse transcriptase which can convert a single stranded RNA genome into double stranded viral DNA. Or

1. They are RNA viruses.
2. They are spherical in form, about 100 nm in diameter.
3. They are enveloped by host plasma membrane.
3. Although few retroviruses are non specific (that is they can infect any cell), most of them can infect only host cells that possess required receptors.
4. Retroviruses have a DNA polymerase called reverse transcriptase which uses the viral RNA as a template to synthesize single stranded DNA. Once formed, the single stranded DNA serves as template to form a double stranded DNA. The viral RNA is destroyed and the two DNA strands twist with one another to form a double helix. The DNA then migrates to the cell nucleus and integrates to one of the host cell's chromosomes, where it is known as a provirus. The viral DNA remains in the host and is replicated when host DNA is replicated. When and if this DNA is transcribed, new viruses are produced. These viruses are usually released by budding. Viruses that do not have an outer envelope exit by cell lysis.
5. The human immune deficiency virus (HIV) that causes acquired immune deficiency syndrome (AIDS) is a retrovirus. Certain cancer causing viruses also retroviruses.

2. **A) Hepatitis:**

1. Hepatitis is an inflammation of the liver.
2. It is usually caused by viral infection, toxic agents or drugs.
3. It is characterized by jaundice, abdominal pain, liver enlargement, fatigue, and some times fever.
4. It may be mild or can be acute or chronic and can lead to liver cancer.

B) Types of Hepatitis: -

Different types of hepatitis are:

1. **Hepatitis A**, formerly called **Infectious Hepatitis** less virulent hepatitis caused by non-enveloped RNA, transmitted by feces.

- DNA
body fluids
semen.
2. **Hepatitis B or Serum Hepatitis** severe form of hepatitis caused by virus, transmitted by infected such as blood, urine, saliva, or
- Hepatitis
less severe
3. **Hepatitis C or Infusion Hepatitis**, formerly called Non-A, non-B caused by enveloped RNA virus, than Hepatitis A or B.
3. **Different Types of Virus:** -
1. Rod-shaped (e.g. TMV)
 2. Spherical (e.g. Polio)
 3. Tadpole like (e.g. Bacteriophages)
4. **Binomial Nomenclature:** -
See Multan Board Answer No: 8
5. **Poliomyelitis:** -
1. Poliomyelitis, abbreviated as Polio is found all over the world.
 2. It mostly occurs in children.
 3. Viruses that cause polio are among the smallest virions, measuring 27 nm.
 4. Polio viruses are RNA viruses.
 5. They are transmitted by contaminated water and food.
 6. Polio viruses enter through mouth, multiply first in the tonsils and then in lymphoid tissues of the gastrointestinal tract causing nausea, vomiting and cramps.
- Viruses
cause
may infect
possibly death.
- may pass through blood stream and localize on the meninges where they cause meningitis. Paralysis of arms, legs, and body trunk may result. Viruses medulla of the brain causing difficulty in swallowing, breathing and possibly death.
6. **A) Hepatitis:**
See Bahawalpur Board Answer No: 2
- B) Serum Hepatitis:** -
Hepatitis B is called Serum Hepatitis.
7. **Virus as Obligate Intracellular Parasite:**
See Multan Board Answer No: 23
8. **Classification of Viruses:** -
Virus morphology and nucleic acid properties are most important for classifying plant, animal and bacterial viruses. The genetic material may be DNA or RNA, naked, enveloped or complex. On the basis of morphology viruses are classified into:
1. Rod-shaped (e.g. TMV)
 2. Spherical (e.g. Polio)
 3. Tadpole like (e.g. Bacteriophages)
9. **Labelled Diagram of Bacteriophage:** -

- 10. Reasons showing Two Kingdom Classification Unworkable:**
 Some biologists found Two Kingdom Classification unworkable because many unicellular organisms like Euglena that have both plant like (presence of chlorophyll) and animal like (lack of cell wall) characters and also because it ignores the difference between prokaryotic and eukaryotic cells.
- 11. Difference between Retroviruse and Bacteriophage: -**
 See Multan Board Answer No: 1
- 12. Elemination of Small Pox:**
 See Multan Board Answer No: 2
- 13. Difference between Capsids and Capsomeres: -**

| Capsids | Capsomeres |
|---|--|
| Capsids are protein coats around the genome of viruses which protect and give shape to the viruses. | Capsomeres are individual protein subunits of capsids that form the capsids and their number is characteristic for a particular virus. |

Dera Ghazi Khan Board
Questions

- Define Species. (A-2008)
- Give preventive measures of AIDS. (A-2008)
- Give units of Classification of Animals. (A-2009)
- What was the contribution of Chamberland? (A-2009)
- State the symptoms of Small Pox. (A-2010)
- Define Virology. (A-2010)
- Write the scientific name of Amaltas. (A-2011)
- Define Binomial Nomenclature. Who devised this system? (A-2011)
- Define species.Give two examples. (A-2012)
- What are Oncoviruses? (A-2012)
- What are prions? (A-2013)

Answers

- 1. Species: -**
 Species is a population of organisms potentially capable of breeding naturally among themselves and having offsring that also intrbreed. Or
 Species is a population of reproductive isolated individuals. Or
 Species is a group of natural population which can interbreed freely among themselves and produce fertile offsprings, but are reproductively isolated from all other such groups in nature. Or

According to the biological species concept species is one or more populations whose members are capable of interbreeding in nature to produce fertile offspring and do not interbreed with members of other species. According to evolutionary species concept, species must have undergone evolution long enough for statistically significant differences to emerge.

Or

1. It is a group of organisms which have numerous physical features in common and which are normally capable of interbreeding producing viable fertile offspring.
2. It is a basic unit of classification.
3. Several methods usually are used to identify a species.
 - i. It is common to differentiate species on the basis of key structural characteristics.
 - ii. Among animals, differences in behavior are often useful in identifying species.
 - iii. Fungi, bacteria, and other microorganisms are distinguished on the basis of structure, differences in metabolism that result in the presence or absence of specific chemicals within the organism are often used to help distinguish among species.
 - iv. Groups of organisms that are reproductively isolated constitute a distinct unit of evolution will fit the definition of species well.

2. Preventive Measures of AIDS: -

1. To control the spread of HIV virus, there must be wide public awareness of the nature of the disease and how it is transmitted. People must be able to recognize high-risk behavior and take action to avoid or change it.
2. Avoid high risk sexual activities such as sex with many partners, anal intercourse etc.
3. Mothers who are known to be HIV must not feed their babies.
4. Avoid sharing of blood-contaminated needles or syringes. Always use new sterilized needles.
5. Health workers, who are at high risk acquiring HIV during professional activities, must practice infection-control procedures.
6. Patients receiving blood for treatment of medical illness must test blood with ELISA.

3. Units of Classification of Animals: -

1. Kingdom
2. Phylum (Division)
3. Class
4. Order
5. Family
6. Genus
7. Species

4. Contribution of Chamberland: -

Chamberland discovered that agents responsible for rabies (a disease transferred to humans)

by bites of rabid dogs, foxes, cats, bats, and other animals) can pass through porcelain filters,
although bacteria can not pass through them.

5. Symptoms of Small Pox: -

The earliest symptoms of Small Pox are fever and prostration. Pink-red spots called macules, soon follow, first on the face and then on the body trunk. The spots become pink pimples or papules and then fluid filled vesicles which soon become deep pustules which break open and emit pus. If person survives, the pustule will leave pitted scars or pocks.

6. Virology: -

The branch of biology which deals with study of viruses is known as Virology.

7. Scientific name of Amaltas: -

Cassia fistula

8. A) Binomial Nomenclature: -

See Multan Board Answer No: 8

B) Scientist who devised Binomial Nomenclature: -

Charles Linnaeus (1707-1778) Swedish Botanist

9. A) Species:

See Dera Ghazi Khan Board Answer No: 1

B) Two Examples: -

1. *Homo sapiens*

2. *Canis lupis*

10. Oncoviruses: -

1. Oncoviruses are cancer causing viruses that can transform normal cells to cancer cells.

2. Some retroviruses are oncoviruses that may develop cancer when they enter cells and assume a lysogenic relationship with these cells. The proteins encoded by viruses may bring about profound changes associated with cancers.

11. Prions: -

See Multan Board Answer No: 10 or 13

Lahore Board

Questions

1. What are Oncoviruses? (A-2006)
2. Define Species. (A-2007)
3. What are Reverse Transcriptases? (A-2007)
4. Write the number of Capsomeres in Capsid of Herpes Virus. (A-2008)
5. What is Binomial Nomenclature? (A-2008)
6. Define Obligate Parasites? (A-2009)
7. Why Paramyxoviruses famous for? (A-2009)
8. Viruses are "Obligate Intracellular Parasites" what is meant by it? (A-2010)
9. What are Pocks? (A-2010)
10. What are Capsids made up of? (A-2011)
11. What are Pocks? (A-2011)
12. Explain briefly Pox Viruses. (A-2012)
13. What are Pocks? (A-2012)

14. Differentiate between Prions and Virions. (A-2012)
15. Define Species. (A-2012)
16. What is reverse transcription? (Group I-A-2013)
17. What is binomial nomenclature? (Group II-A-2013)

Answers

1. **Oncoviruses -**
See Dera Ghazi Khan Board Answer No: 10
2. **Species:**
See Dera Ghahzi Khan Board Answer No: 1
3. **Reverse Trancriptases: -**
See Multan Board Answer No: 14
4. **Number of Capsomeres in Capsid of Herpe Virus: -**
162 Capsomeres are present in Capsid of Herpe Virus
5. **Binomial Nomenclature: -**
See Multan Board Answer No: 8
6. **Obligate Parasites: -**
The infectious particles (viruses) that can function only when inside a living cell are called
Obligate Parasites. Or
They only reproduce in cells by replication and can not be grown in artificial media.
Or
Organisms that only grow inside the cells of plants or animals or inside microorganisms
Example: Viruses
7. **Paramyxoviruses Famous for: -**
Measeles and Mumps viruses belong to group Paramyxoviruses.
8. **Obligate Parasites: -**
Viruses are "Obligate Intracellular Parasites". It means they can reptoduce only in
animal and plant cells or microorganisms by replication and can not be grown on
artificial media.
9. **Pocks: -**
See Multan Board Answer No: 16
10. **Capsids:**
Capsids are made up of proteins. Or
Chemically capsids are made up of proteins and physically they are made up of capsomers or subunits that join togaether to form the capsid.
11. **Pocks: -**
See Multan Board Answer No: 16
12. **Pox Viruses: -**
 1. Pox viruses are one of the largest virions.
 2. They are brick-shaped particles.
 3. They are DNA viruses.
 4. The nucleocapsid is surrounded by a series of fiber-like rods.
 5. The virion has no envelop.

13. **Pocks: -**
See Multan Board Answer No: 16
14. **Difference between Prions and Virions: -**
See Multan Board Answer No: 19
15. **Species: -**
See Dera Ghahzi Khan Board Answer No: 1
16. **Reverse Transcription: -**
It is a process in retroviruses in which an enzyme known as reverse transcriptase catalyzes the productin of DNA using RNA as a template. Or
Production of DNA from RNA is called Reverse Transcription.
17. **Binomial Nomenclature: -**
See Multan Board Answer No: 8

Gujranwala Board

Questions

1. What is Reverse Transcriptase? (A-2006)
2. What do you know about Obligate Intracellular Parasites? (A-2007)
3. Write a short note on AIDS. (A-2007)
4. State the contribution of Carlous Linnaeus in biology. (A-2008)
5. Define species. (A-2008)
6. Write down family and name of Corn. (A-2009)
7. What is the role of Reverse Transcriptase in Retroviruses? (A-2009)
8. What is Prophage and Lysogeny? (A-2010)
9. What is Binomial Nomenclature? Who did introduce this system? (A-2010)
10. What are naked virions? (A-2011)
11. How Hepatitis A is transmitted? (A-2011)
12. Define Binomial Nomenclature. Who introduced it? (A-2012)
13. Differentiate between lysogeny and induction in bacteria. (A-2012)
14. What is a prophage? (A-2013)

Answers

1. **Reverse Transcriptase: -**
See Multan Board Answer No: 14
2. **Obligate Intracellular Parasites: -**
See Lahore Board Answer No: 6
3. **Short Note on AIDS: -**
 1. AIDS is acronym for Acquired Immune Deficiency Syndrome and is caused by the human immunodeficiency viruses (HIV).
 2. HIV consists of two molecules of RNA and two molecules of reverse transcriptase.
A spherical protein capsid surrounds the genome and a lipid-protein envelope with spikes of protein lies outside capsid.
 3. The major cell infected by HIV is the helper T-lymphocyte which is a major component of immune system. As the infection continues, the decrease of lymphoctes results in the failure of the immune system and the infected person

becomes susceptible to other diseases. Cells of nervous system can also be infected by HIV. Symptoms of AIDS include are rare vascular cancer, sudden weight loss, swollen lymph nodes and general loss of immune function.

4. Contribution of Carlous Linnaeus in Biology: -

He introduced a system of naming of organisms called Binomial Nomenclature.

5. Species: -

See Dera Ghazi Khan Board Answer No: 1

6. Family and Name of Corn: -

1. Family Poaceae
2. Name-*Zea mays*

7. Role of Reverse Transcriptase in Retroviruses: -

It synthesizes a DNA molecule from the code supplied by an RNA molecule.

Or

Reverse transcriptase produced by retroviruses catalyzes the production of DNA using

RNA as template. Or

It carries out RNA → DNA transcription. This DNA is single stranded DNA.

Using host

enzyme this DNA becomes double-stranded DNA.

Or

The term reverse transcriptase is derived from reversal of usual biochemistry because this

enzyme converts single stranded RNA into single stranded DNA which soon becomes

double stranded. It often makes mistakes and so introduces mutation.

8. A) Prophage:

See Multan Board Answer No: 15

B) Lysogeny: -

Lysogeny is a phenomenon in which a virus remains in the cell cytoplasm as a

fragment of DNA or attaches to chromosome, but fails to replicate in or destroy the cell.

Or

Lysogeny is a condition in which viruses and bacteria coexist without damage to

each other.

Or

Lysogeny is a process wherein a viral genome is released within the cytoplasm of a

host cell and there upon integrates itself to the chromosomeal material of the host

cell to maintain co-existence within the cell.

Or

1. It is a process in which a phage incorporates into bacterium DNA and does not

replicate or destroy the bacterium.

the

2. The phage that enters lysogeny is known as a temperate phage and

integrated viral DNA is a prophage.

Or

1. Lysogeny is a process in which a bacteriophage or animal virus may incorporate its DNA or its RNA (via DNA) into a chromosome of the cell.

2. When bacteriophages are involved, the phage DNA in the lysogenic state is

involved in called a prophage. When an animal virus, such as retrovirus, is
lyso-geny, the viral DNA is known as a provirus.
Hence 3. Virus is propagated each time the cell's chromosomes is reproduced.
prophage or provirus can confer new properties on the infected cell.

9. A) **Binomial Nomenclature:** -
 See Multan Board Answer No: 8
 B) **Scientist who devised Binomial Nomenclature:** -
 Charles Lnnaeus (1707-1778) Swedish Botanist

10. **Nacked Virions:** -
Non-enveloped viruses are known as Nacked Virions.

11. **Transmission of Hepatitis A:** -
 1. Hepatitis A is most commonly transmitted by the fecal-oral through
contamination
 of food or water by the feces of an infected individual.
 2. An infected food handler is often involved in outbreaks but outbreaks have
also been
 traced to day-care centers where contact may take place with feces.
 3. Saliva contact, sexual contact, and arthropods have also been implicated
in
 transmission.
 4. In addition disease may be transmitted by the consumption of raw
shellfish such
 clams and oyster, since these animals filter and concentrate viruses from
contaminated sea water.

12. A) **Binomial Nomenclature:** -
 See Multan Board Answer No: 8
 B) **Scientist who devised Binomial Nomenclature:** -
 Charles Lnnaeus (1707-1778) Swedish Botanist

13. **Differences Between Lysogeny and Induction in Bacteria:** -

| Lysogeny in Bacteria | Induction in Bacteria |
|---|---|
| 1. It is the incorporation of phage DNA into bacterial DNA. | 1. It is detachment of phage DNA from bacterial DNA. |
| 2. Phage DNA does not replicate and does not form new phage viruses. | 2. Phage virus starts replication and new phages are formed. |
| 3. No lysis of bacterium takes palce. | 3. Lysis of bacterium takes place. |

14. **Prophage:-**
 See Multan Board Answer No: 15

Rawalpindi Board
Questions

1. Define Species. (A-2010)
2. What are Prions? (A-2010)
3. Write down the biological classification of Corn. (A-2011)
4. What is Induction in life cycle of a Phage? (A-2011)
5. Write down Bilogical Classification of Corn. (A-2012)

- 6. What is Binomial Nomenclature? Who devised the system? (A-2012)
- 7. Differentiate between Capsid and Capsomeres? (A-2013)

Answers

- 1. **Species:**
See Dera Ghahzi Khan Board Answer No: 1
- 2. **Prions:**
See Multan Board Answer No: 10 or 13
- 3. **Biological Classification of Corn: -**
See Multan Board Answer No: 3
- 4. **Induction in Life Cycle of a Phage: -**
Sometimes viral DNA (prophage) in lysogenic state gets detached from the host's chromosomes and lytic cycle starts. This process is called Induction.
Or
It is detachment of prophage from bacterial chromosome and the start of lytic cycle.
- 5. **Biological Classification of Corn: -**
See Multan Board Answer No: 3
- 6. **A) Binomial Nomenclature: -**
See Multan Board Answer No: 8
B) Scientist who devised Binomial Nomenclature: -
Charles Lnnaeus (1707-1778) Swedish Botanist
- 7. **Difference between Capsid and Capsomeres: -**
See Bahawalpur Answer No: 13

Sargodha Board Questions

- 1. Define Binomial Nomenclature with one example. (A-2010)
- 2. Write the number of Capsomeres in Capsid of Herpes Virus and Adeno Virus. (A-2010)
- 3. Differentiate between virulent and non-virulent Phages. (A-2011)
- 4. What are Retroviruses? Give example. (A-2011)
- 5. What do you know about Herpes Simplex? (A-2012)
- 6. What is Lysogenic cycle of Phage? (A-2012)
- 7. Define a species.(A-2013)

Answers

- 6. **Binomial Nomenclature: -**
See Multan Board Answer No: 8
- 2. **Number of Capsomeres in Capsid of Herpes Virus and Adeno Virus: -**
162 Capsomeres are present in Capsid of Herpes Virus and 252 Capsomeres are present in Capsid of Adeno Virus.
- 3. **Differences Between Virulent and Non-virulent Phages: -**

| | |
|------------------------|----------------------------|
| Virulent Phages | Non-Virulent Phages |
|------------------------|----------------------------|

| | |
|---|---|
| <p>1. Bacteriophages that replicate within bacteria and destroy them are known as Virulent Phages. Or The phages which cause lysis of the host cells are known as Virulent Phages.</p> <p>2. They are also known as Lytic Phages.</p> | <p>1. Bacteriophages that coexist for a time within bacteria without replicating in or destroying them is called Non-Virulent Phages. Or Phages which cause lysogeny are called Non-Virulent Phages.</p> <p>2. They are also known as Temperate Phages.</p> |
|---|---|

4.

Retroviruses with example:

See Bahawalpur Board Answer No: 1
5.

Herpes Simplex:

See Multan Board Answer No: 24
6.

Lysogenic Cycle of Phage:

Lysogenic Cycle of Phage is completed in the following steps.

1.

Attachment:

The phage attaches to the cell surface of a bacterium.

2.

Penetration:

Phage DNA enters the bacterium.

3.

Integration:

Phage DNA first forms closed circle and align next to bacterial chromosome and then integrates into bacterial chromosome.

4.

Replication:

The integrated prophage is replicated along with bacterial chromosome during cell division.
7.

Species:

See Dera Ghahzi Khan Board Answer No: 1

Faislabad Board

Questions

1.

What are Prions? (A-2007)
2.

How can we prevent from AIDS? (A-2007)
3.

Define Species and give two examples. (A-2008)
4.

Enlist the Modified Five Kingdom Classification of Margulis and Schwartz. (A-2008)
5.

What do you mean by Obligate Parasite? (A-2009)
6.

Define Lysogeny and Induction in Bacteriophage. (A-2009)
7.

What is Reverse Transcriptase? (A-2010)
8.

What is the biological name for Potato? (A-2010)
9.

What is Binomial Nomenclature? (A-2011)
10.

Differentiate between Lytic Phage and Temperate Phage. (A-2011)
11.

What are Prions? (A-2012)
12.

Define the term Adsorption. (A-2012)
13.

What is induction? (A-2013)

Answers

1. **Prions:**
See Multan Board Answer No: 10 or 13
2. **Prevention of AIDS: -**
See Dera Ghazi Khan Answer No: 2
3. **Species:**
See Dera Ghahzi Khan Board Answer No: 1
4. **List of Modified Five Kingdom Classification of Margulis and Schwartz:**
 1. Prokaryotae
 2. Fungi
 3. Protocista
 4. Plantae
 5. Animalia
5. **Obligate Parasite: -**
See Lahore Board Answer No: 6
6. **A) Lysogeny in Bacteriophage:-**
See Gujranwala Board Answer No: 8 (B)
B) Induction in Bacteriophage: -
See Rawalpindi Board Answer No: 4
7. **Reverse Transcriptase: -**
See Multan Board Answer No: 14
8. **Biological Name for Potato: -**
Biological Name for Potato is *Solanum tuberosum*.
9. **Binomial Nomenclature: -**
See Multan Board Answer No: 8

| 10. Difference Between Lytic Phage and Temperate Phage: | |
|---|--|
| Lytic Phage | Temperate phage |
| 1. It forms master slave relationship with the bacterium. | 1. It forms host-guest relationship with the bacterium. |
| 2. It replicates and forms new phages. | 2. It coexists for a time within the bacterium without replicating in. |
| 3. It lyses the bacterium. | 3. It does not destroy the bacterium. |

11. **Prions:**
See Multan Board Answer No: 10 or 13
12. **Adsorption: -**
 1. Adsorption is the attachment of the phage to its host cell.
 2. For adsorption to occur, a site on phage must match with a complementary receptor site on the cell wall of the bacterium.
 3. Actual attachment consists of a weak chemical union between virion and receptor site.
13. **Induction: -**
Induction is a process in which viral DNA gets detached from the host's chromosomes

and lytic cycle starts.

Chapter No: 6 1 SQ Multan Board

Questions

1. Give chemical composition of Gram Negative and Gram Positive Bacterial Wall. (A-2007)
2. Give postulates of Germ Theory of Disease. (A-2007)
3. List different phases in bacterial growth curve. (Model Paper-2006-08)
4. Write Koch's Postulates. (A-2008)
5. What is Stationary Phase of Bacterial Reproduction? (A-2008)
6. What are Spirilla Bacteria? Give their various forms. (S-2008)
7. What is Mesosome? Give its importance. (S-2008)
8. Give two benefits of Cyanobacteria. (A-2009)
9. What is a Cyst? How it is different from Spore? (A-2009)
10. What are Photosynthetic Bacteria? Give two examples. (S-2009)
11. Define Heterocyst. What is its function? (A-2009)
12. What are useful aspects of Cyanobacteria? (A-2010)
13. Define Water Blooms. What are their effects on animals? (A-2010)
14. What is the Ecological Importance of Bacteria? (A-2010)
15. What are Pili and their functions? (S-2010)
16. Differentiate Antiseptics from Disinfectants. (S-2010)
17. Compare Nucleus with Nucleoid. (A-2011)
18. Enlist the achievements of Louis Pasteur in the field of Microbiology. (S-2011)
19. Differentiate between Microbicidal and Microbistatic effects of Chemicals. (S-2011)
20. Name different taxonomic groups of bacteria on the basis of presence of Flagell, their number and pattern of attachment. (A-2012)
21. Briefly describe economic importance of Cyanobacteria. (A-2012)
22. What are Plasmids and their role in Genetic Engineering? (A-2013-New)
23. Define Atrichous Bacteria. (A-2013-Old)
24. Differentiate between Monotrichous and Lophotrichous Bacteria. (A-2013-Old)

Answers

1. **A) Chemical Composition of Gram Negative Bacterial Wall: -**
Cell wall of Gram positive bacteria is composed of a peptidoglycan layer about 25 nm wide and contains an additional polysaccharide called teichoic acid. It also contains lipoteichoic acid. Peptidoglycan is a large molecule composed of alternating units of two amino-containing carbohydrates, N-acetylglucosamine and N-acetylmuramic acid joined by cross-bridges of four amino acids. About 60 to 90 percent of the cell wall is peptidoglycan and 1-4 percent of it is lipid.
- B) Chemical Composition of Gram Positive Bacterial Wall: -**
Cell wall of Gram negative bacteria has peptidoglycan layer which is only 3 nm wide without any evidence of teichoic acid. Cell wall in these bacteria contains various polysaccharides, proteins, and lipids and is much more complex. About 10 percent of cell wall is peptidoglycan and 11-12 percent lipids. Also the cell wall is

surrounded by an outer membrane which resembles the plasma membrane but contains polysaccharides bounded to lipids. Outer membrane is barely separated from the cell wall by periplasmic space. On the inner side of cell wall the periplasmic space is wider.

2. **Postulates of Germ Theory of Disease: -**

1. A specific microorganism is related to a specific disease which must be identified in all cases of the disease.
 2. The microorganisms must be isolated and grown in pure culture.
 3. Disease must be produced in experimental animals inoculated with these pure cultures.
 4. The same microorganisms must then be recovered from experimental animals.
- Or
1. A specific organism can always be found in association with a given disease.
 2. The organism can be isolated and grown in pure culture in the laboratory.
 3. The pure culture will produce the disease when inoculated into susceptible animal.
 4. It is possible to recover the organism in pure culture from experimentally infected animal.
- Or
1. The pathogen must be present in every individual with the disease.
 2. A sample of the microorganism taken from disease host can be grown in pure culture.
 3. When a sample of the pure culture is injected into healthy host, it causes the same disease.
 4. The microorganism can be recovered from the experimentally infected host.

3. **List of Different Phases in Bacterial Growth Curve:**

1. Lag Phase
2. Log Phase
3. Stationary Phase
4. Death / Decline Phase

4. **Koch's Postulates: -**

See Multan Board Answer No: 2

5. **Stationary Phase of Bacterial Reproduction: -**

1. It is the phase of bacterial growth curve in which bacterial multiplication is equal to death rate.
- Or
- It is the phase of bacterial growth when bacterial death rate is equal to bacterial rate of reproduction and multiplication.
- Or
- In stationary phase of bacterial growth curve reproductive and death rates equalize.
2. It occurs when antibodies from the immune system of human being have begun to attack the bacteria and phagocytosis by white blood cells adds to their destruction.

| | |
|---------------|--|
| body's | Perhaps the person was administered an antibiotic to supplement the |
| | defensive measures. |
| 3. | It also occurs when in the culture tube nutrients have become scarce, |
| waste | products are accumulating and factors such as oxygen or water may be in |
| short | supply. |
| 6. | A) Spirilla Bacteria: - |
| coma | Spirilla (sing.Spirillum) are long and helical shaped or spirally coiled or |
| | shaped bacteria. Or |
| | They form spirals. |
| | B) Various Forms of Spirilla Bacteria: - |
| | 1. Spirilla: |
| rigid cell | True spirilla are rigid bacteria. They are corkscrew shaped with a |
| They | wall and a hair like projections called flagella that assist movement. |
| through | generally do not form association with other cells, they swim singly |
| | their environments. |
| | 2. Spirochete: |
| but no | They are flexible spiral shaped bacteria. They have flexible cell wall |
| occurs by | flagella in the traditional sense. Movement in these organisms |
| the cell. The | contraction of long filaments (endoflagella) that run the length of |
| | organism of syphilis is an example of a spirochete. |
| | 3. Vibrio: |
| microscope. | A spirillum shaped like a comma is called a Vibrio. Or |
| | A vibrio is a curved rod that resembles comma under the |
| | It may be flagellated. A cholera organism is a typical vibrio. |
| 7. | A) Mesosome: - |
| are in the | Mesosomes are invaginated regions of the plasma membrane. Or |
| | Mesosomes are invagination of cell membrane into the cytoplasm which |
| | form of vesicles, tubules or lamellae. |
| | B) Importance of Mesosome: - |
| export of | They function in respiration or photosynthesis. Or |
| | Their function is to help in DNA replication, cell division, respiration and |
| | exocellular enzyme. Or |
| | i. Mesosomes are involved in DNA replication. |
| | ii. They are involved in cell division. |
| | iii. Some mesosomes are also involved in export of exocellular enzymes. |
| | iv. Respiratory enzymes are also present on the mesosomes. |
| | Or |
| | i. It serves as an anchor for the attachment of DNA during replication. |
| | ii. It serves as a site for enzymes that function in cell wall synthesis. |
| factor that | iii. It is the location of enzymes used in energy production by the cell, a |
| eukaryotic | makes it equivalent of the membranes in the mitochondria of a |
| | cell. |

8. Two Benefits of Cyanobacteria: -

1. Cyanobacteria are thought to have added oxygen to the earth's atmosphere as a by product of their photosynthesis.

2. They are photosynthetic partners in most of lichen association.

Or

1. Cyanobacteria have heterocysts which are helpful in fixation of atmospheric nitrogen.

2. Oscillatoria and few other cyanobacteria can be used as pollution indicator.

Or

1. They can serve as food for heterotrophs in ecosystem.

2. In association with fungi, cyanobacteria form lichens which contribute to soil formation.

9. A) Cyst: -

1. Cyst is dormant, thick-walled desiccation resistant form of a bacterium.

2. It develops during differentiation of vegetative cell.

3. It can germinate under suitable condition.

B) Cyst Different From Spore: -

It is not heat resistant while spore is heat resistant.

10. A) Photosynthetic Bacteria: -

1. Bacteria which trap energy by photosynthesis are called Photosynthetic Bacteria.

2. These bacteria have pigments known as bacteriochlorophylls to distinguish them from chlorophylls of plants. These pigments are dispersed in the cytoplasm of bacteria.

3. In the production of carbohydrate in the dark reaction, these bacteria do not use water as a source of hydrogen ions. Consequently no oxygen is liberated.

4. Certain species of bacteria use small fatty acids as hydrogen ion donors while majority of such bacteria use hydrogen sulfide (H₂S) as a hydrogen ion source and convert hydrogen sulfide to sulphur that is liberated.

Light



Chlorophyll

Or

Photosynthetic Bacteria possess chlorophylls which are different from green plants.

These chlorophylls are present on invaginated plasma membrane in the cytoplasm and not in the chloroplasts. During photosynthesis, bacteria utilize H₂S instead of water and liberate sulfur instead of oxygen.

Light



Chlorophyll

B) Two Examples of Photosynthetic Bacteria:

a. Green Sulfur Bacteria e.g. *Chlorobium*

b. Purple Sulfur Bacteria e.g. *Chromatium*

11. A) Heterocyst: -

Heterocyst is a slightly oblong, colorless cell with slightly thicker walls in the trichome of a cyanobacterium. Or
It is slightly large, round, light yellowish thick walled cell in the trichome of a cyanobacterium.

B) Function of Heterocyst: -

1. It is the site for nitrogen fixation.
2. It is specially concerned in the multiplication of filament during unfavorable conditions.

12. Useful Aspects of Cyanobacteria: -

1. Many species of Cyanobacteria incorporate atmospheric nitrogen into organic compounds useful to plants.
2. They release oxygen in the environment due to their photosynthetic activity.
3. *Oscillatoria* and few other cyanobacteria can be used as pollution indicator.
4. *Nostoc anabena* is used as nitrogen fertilizer in agriculture due to their high nitrogen fixing ability. They are grown in fields for improving soil fertility.
5. In association with fungi, cyanobacteria form lichens which contribute to soil formation.

13. A) Water Blooms: -

1. Water blooms are the waters of the ponds or lakes which have huge number of cyanobacteria or other algae. Or
The sporadic occurrence of huge number of algae in freshwaters is known as

Water Bloom. Or
A rapid increase in the number of microorganisms such as cyanobacteria in a water body due to rich supply of nutrients in the water body is known as

- Water Bloom.
2. When ponds or lakes contain a rich supply of nutrients, cyanobacteria may bloom and convert the water to a peasoup green with foul taste.
3. They occur when algicide is not used regularly in water bodies.

B) Effects of Water Blooms on Animals: -

Some species of cyanobacteria produce toxins in the water that kill live stock and other animals that drink the water.

14. Ecological Importance of Bacteria: -

Bacteria are ecologically very important. They are essential decomposers that break down dead organic matter and wastes. They use the products of decomposition as an energy source. When bacteria break down organic compounds, chemical compounds are recycled. Many nutrients including nitrogen, oxygen, carbon, phosphorous, sulfur, and

certain trace elements are recycled in this way.

- 15. A) Pili: -**
Pili are extremely thin appendages smaller than flagella. Or
Pili are hollow, non-helical, filamentous appendages, smaller than flagella
and are made up of special protein called pilin. True pili are only present on Gram
negative bacteria. Or
Pili (sing. Pilus) are bacterial appendages that appear as short flagella but
have no function in motility. Pili are primarily found on Gram-negative bacteria
such as *Neisseria gonorrhoeae*, the causative agent of gonorrhea. Pili are
composed of Pilin protein.
- B) Functions of Pili: -**
They help in conjugation and not in locomotion. Or
1. They are involved in a mating process between cells called
conjugation process.
2. Some pilli function as a means of attachment of bacteria to various
surfaces. Or
1. Certain pili aid transfer of genetic material among bacteria during
conjugation.
2. Some pili anchor the bacteria to surfaces such as living tissues. As
attachment structures, pili enhance the organism's ability to cause disease.

16. Difference between Antiseptics and Disinfectants: -

| Antiseptics | Disinfectants |
|--|---|
| 1. Chemical agents used to destroy pathogens on living object such as a tissue of human body are known as Antiseptics. | 1. Chemical agents used to destroy pathogens on lifeless object such as a table top are known as Disinfectants. |
| 2. Antiseptics are used on body tissues such as on a wound or before piercing the skin to take blood. | 2. A disinfectant is used on inanimate objects such as table top or equipment used in a surgical operation. |
| Examples: Tincture of iodine, silver Nitrate, 70 % ethyl alcohol etc. | Examples: Potassium permanganate, alcohol, formaldehyde etc. |

17. Comparison of Nucleus with Nuceoid: -

| Nucleus | Nucleoid |
|--|--|
| 1. Nucleus is a rougly spherical body that occupies a relatively fixed position near the centre of the eukaryotic cell and | 1. The term nucleoid is often applied to the chromosome region of a bacterial cell (a prokaryotic cell). |

| | |
|--|---|
| contains chromosomes, nceolus and nucleoplasm. | 2. It is a dense zone of cytoplasm which is not enclosed by nuclear envelope. |
| 2. It is bounded by a double membrane called nuclear envelope which separates the nuclear contents from surrounding cytoplasm. | 3. It has a single chromosome consisting largely of a circular strand of DNA. |
| 3. It has several linear chromosomes. | 4. Only one nucleoid region is present in the cell. |
| 4. Usually one nucleus is present in the cell but many cells have two to many nuclei. | |

18. The Achievements of Louis Pasture in the field of Microbiology: -

1. Pasture’s main achievements are the development of vaccines for disease
anthrax,

fowl or chicken cholera and rabies.
2. He made significant contributions in development of pasteurization.
3. He also made significant contributions in development of fermentation
industries.
4. He proved that microorganisms could cause disease.

19. Differences Between Microbicidal and Microbistatic Effects of Chemicals: -.

| Microbicidal Effects of Chemicals | Microbistatic Effects of Chemicals |
|---|--|
| 1. Microbicidal Effects of Chemicals are one that kill microbes immediately. | 1. Microbicidal Effects of Chemicals are one that temporarily prevent further multiplication of microbes without necessarily killing them. |
| 2. A microbicidal chemical or microbicidal agent may inactivate the enzymes of a microbe and ineterfere with its metabolism so that it dies. | 2. A microbistatic chemical or microbistatic agent disrupts a minor chemical reaction and slows the metabolism resulting in a longer time between divisions. |

20. Name of Different Taxonomic Groups of Bacteria on the Basis of Presence of Flagella,

their Number and Pattern of Attachment: -

1. **Monotrichous** Bacterium with a single flagellum
2. **Lophotrichous** Bacterium with a group of two or more flagella at its one
pole
3. **Amphitrichous** -Bacterium characterized by groups of flagella at both
ends
4. **Peritrichous** --Bacterium covered with flagella or surrounded by flagella

21. **Economic Importance of Cyanobacteria: -**

- 1. Many species of Cyanobacteria incorporate atmospheric nitrogen into organic compounds useful to plants.
- 2. They release oxygen in the environment due to their photosynthetic activity.
- 3. *Oscillatoria* and few other cyanobacteria can be used as pollution indicator.
- 4. In association with fungi, cyanobacteria form lichens which contribute to soil formation.
- 5. They have symbiotic relationship with protozoa, fungi, and nitrogen fixing species of angiosperms.
- 6. Cyanobacteria may bloom and convert ponds or lakes water with rich supply of nutrients to a peasoup green with foul taste.
- 7. Expensive Pond Scum produced by Super Blue Green Algae by photophosynthesis in the pond serves as complete whole food which contains 60 % protein with all essential amino acids in perfect balance.

22. **A) Plasmids: -**

- 1. Plamids are closed loops of chromosome in some bacteria.
- 2. They exist apart from the chromosome as independent units in the cytoplasm.
- 3. They contain about two percent of the total genetic information of the cell and multiply independent of the chromosome. Or Plasmids are closed loops of DNA in the cytoplasm of bacteria as an independent units apart from the chromosome. Or Plasmids are circular, double stranded DNA, self-replicating molecules in addition to chromosomes which are not essential for growth and metabolism.

B) Role of Plasmids in Genetic Engineering: -
Plasmids are important vectors in Genetic Engineering.

23. **Atrichous Bacteria: -**

These bacteria have no flagellum.
Or
Bacteria without any flagellum are known as Atrichous Bacteria.

24. **Difference between Monotrichous and Lophotrichous Bacteria: -**

| Monotrichous Bacteria | Lophotrichous Bacteria |
|--|--|
| Monotrichous Bacteria possess a single flagellum. Or When a single polar flagellum is present, the condition is known as Monotrichous. | Lophotrichous Bacteria have a group of two or more flagella at one end. Or If tuft of flagella is present at one pole of bacteria then these are Lophotrichous Flagella. |

Bahawalpur Board

Questions

1. Give a sketch of three types of bacteria. (A-2007)
2. Name the stages of growth and reproduction in Bacteria. (A-2007)
3. What is Binary Fission? (A-2008)
4. What are Hermogonia? (A-2008)
5. Define Germ Theory of Disease. Who formulated it? (A-2009)
6. Name four distinct phases of Bacterial Growth? (A-2009)
7. What are Mesosomes? (A-2010)
8. State the postulates of Germ Theory of Disease. (A-2010)
9. What are Photosynthetic Bacteria? Give two examples. (A-2010)
10. What are Pili? Write their functions. (A-2010)
11. Differentiate between Gram Positive and Gram Negative Bacteria. (A-2010)
12. Distinguish between Cell Walls of Gram Positive and Gram Negative Bacteria. (A-2011)
13. What are the functions of Flagella, Pili, Slime and Capsule in Bacterial cell? (A-2011)
14. Discuss Reproduction in *Nostoc*. (A-2013)

Answers

1. Sketch of Three Types of Bacteria: -

2. Name of the Stages of Growth and Reproduction in Bacteria: -

1. Lag Phase
2. Log Phase
3. Stationary Phase
4. Death / Decline Phase

3. Binary Fission:

1. Binary fission is an asexual process by which a bacterial cell divides to form two new cells.
2. Bacteria reproduce by binary fission when there is ample supply of food and moisture with favourable conditions.
3. In binary fission chromosome duplicates, cell elongates, and plasma membrane pinches off inward at the centre of the cell. When the nuclear material has been evenly distributed, the cell wall thickens and grows inwards to separate the dividing cell.
4. Once the division is complete, bacteria grow and develop the features that make each species unique.
5. The interval of time until the completion of next division is known as the generation time.
6. Binary fission occurs with remarkable speed. Under ideal conditions, some bacterial species divide in less than 20 minutes.

- 4. Hermogonia: -**
 1. Hermagonia (sing.hermagonium) are portions of filament of a cynobacterium between two heterocysts.
 2. During favourable conditions, filament breaks up at the junction of each heterocyst. This results in the formation of a number of pieces called hermagonia.
 3. The end cells of each hermagonium divide to form long filament of cyanobacterium.
- 5. A) Germ Theory of Disease:**
 See Mutan Board Answer No: 2
B) Scientist who Formulated Germ Theory of Disease:
 Robet Koch
- 6. Name of Four Distinct Phases of Bacterial Growth: -**
 See Mutan Board Answer No: 3
- 7. Mesosomes: -**
 See Mutan Board Answer No: 7
- 8. Germ Theory of Disease:**
 See Mutan Board Answer No: 2
- 9. Photosynthetic Bacteria with Two Examples: -**
 See Mutan Board Answer No: 10
- 10. Pili and Their Functions: -**
 See Mutan Board Answer No: 15
- 11. Differences between Gram Positive and Gram Negative Bacteria: -**

| Gram Positive Bacteria | Gram Negative Bacteria |
|--|---|
| 1. Gram Positive Bacteria are blue purple because they retain crystal violet stain (primary stain in Gram staining technique). Or Bacteria that absorb and retain crystal violet stain in the laboratory are referred to as Gram-positive bacteria. | 1. Gram Negative Bacteria appear as orange or red because they lose primary stain when they are rinsed with 95 percent alcohol and accept safranin (secondry stain in Gram staining technique). Or The bacteria which do not retain crystal violet when rinsed with alcohol are known as Gram negative bacteria. |
| 2. Their cell wall is 20-80 nm thick and consists of thick layer of peptidoglycan (50 %), an additional polysaccharide, the techaic acid, and lipotechoic acid. Lipid contents are only 1-4 %. | 2. Their cell wall is 8-11 nm thick and consists of thin layer of peptidoglycan (only 10 %), lipopolysaccharides and lipoprotien. Lipid contents are 11-12 %. Cell wall is also |

| | |
|---|--|
| <p>Cell wall is not surrounded by an outer membrane.</p> <p>6. They produce exotoxin.</p> <p>7. Their nutritional requirements are relatively complex.</p> <p>8. They are more susceptible to penicillin and lysozyme and less susceptible to tetracycline.</p> <p>Examples: Spore forming bacilli and many cocci</p> | <p>surrounded by an outer membrane.</p> <p>6. They produce endotoxins.</p> <p>7. Their nutritional requirements are relatively simple.</p> <p>8. They are more susceptible to tetracycline and less susceptible to penicillin and lysozyme.</p> <p>Example: -Many intestinal bacilli and few cocci</p> |
|---|--|

12. Differences Between Cell Walls of Gram Positive and Gram Negative Bacteria:

| Cell Wall Of Gram Positive Bacteria | Cell Wall of Gram Negative Bacteria |
|---|---|
| <p>1. The cell wall of Gram positive bacteria have only one layer, a very thick layer of peptidoglycan about 25 nm wide. There is no outer membrane. Cell wall is is over all 20-80-nm thick.</p> <p>2. They have an additional polysaccharide known as techoic acid in their cell wall. Lipotichoic acid is also present.</p> <p>3. Periplasmic space is presnt in some bacteria.</p> <p>4. Amount of cell wall lipid is 1-4 per cent.</p> <p>5. Amount of peptidoglycan in the cell wall is 50 per cent.</p> <p>6. Cell wall is more permeable.</p> | <p>1. The cell wall of Gram-negative bacteria have two layers, a thin layer of peptidoglycan and a thick outer membrane. Cell wall is over all 6-11 nm thick.</p> <p>2. They have lipopolysaccharides and lipoprotein in their cell wall. Techoic acid is absent.</p> <p>3. Periplasmic space is present in all bacteria.</p> <p>4. Amount of cell wall lipid is 11-12 per cent.</p> <p>5. Amount of peptidoglycan in the cell wall is 10 per cent.</p> <p>6. Cell wall is less permeable..</p> |

- 13. A) Functions of Flagella in Bacterial Cell: -**
- Most motile bacteria move by means of rotating flagella. Or They help in motility.
 - Flagella also help the bacteria to detect and move in response to chemicals, a process known as chemotaxis.
- B) Functions of Pili in Bacterial Cell:**
- They help bacteria adhere to certain surfaces such as the cell they infect.

2. Some elongated pili, called sex pili, are involved in transmitting DNA between bacteria. Or
1. They are primarily involved in conjugation.
 2. Some pili function as a means of attachment of bacteria to various surfaces.

C) Functions of Slime in Bacterial Cell:

1. Fibers of slime attach bacteria to tissue surfaces. For example, *Streptotococcus mutans* attaches itself by its fibers to the surface of teeth.
2. In food products, the slime-producing bacteria may cause an unsightly and distasteful experience. Or
Slime provides greater pathogenecity to bacteria and protects them against phagocytosis.

D) Functions of Capsule in Bacterial Cell:

1. In free-living species, the capsule may provide the cell with added protection against phagocytosis by other microorganisms.
2. In disease causing bacteria, the capsule may protect against the host's white blood cells.
3. Bacteria also use their capsules to attach to surfaces such as rocks, roots, human teeth (where they cause dental plaque). Or
1. The capsule serves as a buffer between the cell and its external environment.
2. Because of its high water content, capsule protects the cell against dehydration while preventing nutrients from flowing away.
3. In the body, it also contributes to the establishment of disease because white blood cells that normally engulf and destroy bacteria by phagocytosis can not perform this function on encapsulated bacteria.

14. Reproduction in *Nostoc*:

Nostoc reproduces only asexually. Sexual reproduction is absent.
See Gujranwala Board Answer No: 12

Dera Ghazi Khan Board Questions

1. State two postulates of Germ Theory of Diseases. (A-2008)
2. Point out different phases in Bacterial Growth. (A-2008)
3. Define Pili and write its functions. (A-2009)
4. What do you know about Plasmid? (A-2009)
5. What are Amphitrichous and Peritrichous Bacteria? (A-2010)
6. Differentiate between Antiseptics and Disinfectants. (A-2010)
7. Write down any two postulates of Germ Theory of Diseases. (A-2011)
8. What are Akinetes? Give their function. (A-2011)
9. Briefly describe the importance of Cyanobacteria. (A-2012)
10. Differentiate between Antiseptics and Disinfectants. (A-2012)
11. Write Ecological Importance of Bacteria. (A-2012)
12. State the postulates of Germ Theory of Disease. (A-2013)

Answers

1. Two Postulates of Germ Theory of Diseases: -

1. A specific organism can always be found in association with a given disease.
2. The organism can be isolated and grown in pure culture in the laboratory.

2. Different Phases in Bacterial Growth: -

1. Lag Phase: -

It is phase of no growth. Bacteria prepare themselves for division.

Or

This phase encompasses the the first few hours of the curve. Bacteria become accustomed to their new environment. They store nutrients, synthesize enzymes, and and prepare for binary fission.

2. Log (logarithmic) phase:

It is the phase of rapid growth. Bacteria divide at exponential rate. Or
It is the phase of a bacterial growth curve at which reproduction and growth are at their highest rates. In the body they cause extensive tissue damage. In laboratory they form visible colonies in the growing media.

3. Statioary Phase: -

Bacterial death rate is equal to bacteria rate of reproduction and multiplication. Or

Reproductive and death rates equalize. In body, antibodies from immune system have begun to attack bacteria. In the culture tube, nutrients have become scarce, waste products are accumulating and factors such as oxygen or water may be in short supply.

4. Death / Decline Phase:

Bacteria start dying. Here the death rate is more than reproduction rate.

Or

Now the number of cells dying exceeds the number of new cells formed. A capsule may forestall death by acting as a buffer to the environment, and flagella may allow organisms to move to a new location. For many species of bacteria, the history of the population soon comes to an end with the death of last cell.

3. Pili and their Functions: -

See Mutan Board Answer No: 15

4. Plasmid: -

See Mutan Board Answer No: 22

5. A) Amphitrichous Bacteria: -

Amphitrichous is a condition when tuft of flagella at each of two poles is present.

Or

Amphitrichous bacteria are characterized by groups of flagella at both ends. Or

Amphitrichous bacteria have flagella at both poles of the cell.

B) Peritrichous Bacteria: -

In peritrichous form , flagella surround the whole cell. Or
 Peritrichous bacteria are surrounded by flagella. Or
 These bacteria are covered with flagella.

6. Differences Between Antiseptics and Disinfectants: -

See Mutan Board Answer No: 16

7. Any Two Postulates of Germ Theory of Diseases: -

See Dera Ghazi Khan Board Answer No: 1

8. A) Akinetes:

Akinetes are thick walled, enlarged vegetative cells of a filament of a cyanobacterium which accumulate food and become resting cells during unfavourable conditions.

Or

Akinetes are non-motile spores formed from certain vegetative cells of a trichome of a cyanobacterium during unfavorable conditions. They are enlarge, thick walled cells containing reserve food.

B) Function of Akinetes: -

On arrival of favorable conditions akinetes form normal vegetative cells.

Or

At the approach of favavourable conditions, akinetes germinate and form independent filaments by simple cell division.

9. Importance of Cyanobacteria: -

See Multan Board Answer No: 12

10. Differences Between Antiseptics and Disinfectants: -

See Mutan Board Answer No: 16

11. Ecological Importance of Bacteria: -

See Multan Board Answer No: 14

12. Postulates of Germ Theory of Disease: -

See Mutan Board Answer No: 2

Lahore Board

Questions

1. What are Mesosomes and their functions? (A-2006)
2. What is unique about the structure of Bacterial Ribosomes? (A-2007)
3. What is a Trichome in *Nostoc*? (A-2007)
4. Write the difference between Saprophytic and Parasitic Bacteria. (A-2008)
4. What are Pili? Write their functions. (A-2008)
5. Distinguish Antiseptics from Disinfectants. (A-2009)
7. Differentiate Microbicidal from Microbistatic effect of Chemicals on Bacteria.(A-2009)
8. Write down any two postulates of Germ Theory of Disease. (A-2010)
9. What Van Leeuwenhoek is famous for? (A-2010)
10. Differentiate between Spore and Cyst. (A-2011)
11. Write the four stages of growth in Bacteria. (A-2011)
12. What is Mycoplasma? (A-2012)
13. What is Gram Positive Bacteria? (A-2012)
14. Define Nucleoid. (A-2012)
15. Differentiate Microbicidal from Microbistatic effect of Chemical on Bacteria. (A-2012)
16. Write down Medical Importance of Bacteria. (A-2012)

17. What are saprophytic bacteria? (Group I-A-2013)
18. Write down functions of cell wall and flagella in bacterial cell. (Group II-A-2013)

Answers

1. **Mesosomes and their Functions:** -
See Mutan Board Answer No: 7

2. **Unique About the Structure of Bacterial Ribosomes:** -
They are smaller than eukaryotic ribosomes and are of 70 S.

3. **Trichome in *Nostoc*:** -
 1. Single filament of a Nostoc, in which rounded or ovl shaped cells are placed end to end as beads in a chain and are bounded by mucilaginous sheath, is known as Trichome.
 2. All cells in a trichome are mostly similar in structure but at intervals are present slightly large, obolong, light yellowish, thick walled cells called as Heterocysts.

4. **Differences Between Saprophytic and Parasitic Bacteria:** -

| Saprophytic Bacteria | Parasitic Bacetria |
|--|--|
| <ol style="list-style-type: none">1. The hetertrophic bacteria that feed exclusively on dead organic matter are known as Saphrophytic bacteria.2. They live in the soil and get their food from dead organic matter in the form of humus.3. They have very extensive enzyme system that breaks down complex substances into simple ones that are absorbed and utilized by these bacteria as energy source. | <ol style="list-style-type: none">1. The heterotrophic bacteria that feed on living organic matter such as human tissues are known as Parasitic Bacteria.2. They multiply within the living organisms where they digest the tissues and produce toxins that lead to disease.3. They lack certain complex systems of enzymes. |

5. **Pili and their Functions:** -
See Mutan Board Answer No: 15

6. **Differences Between Antiseptics and Disinfectants:** -
See Mutan Board Answer No: 16

7. **Differences Between Microbicidal and Microbistatic Effect of Chemicals on Bacteria:** -
See Multan Board Answer No: 19

8. **Any Two Postulates of Germ Theory of Diseases:** -
See Dera Ghazi Khan Board Answer No: 1

9. Antone Van Leeuwenhoek Famous For:

Antone Van Leeuwenhoek (1673) is famous for reporting tiny microbes such as bacteria and protozoa in marshy water for the first time under his own microscope and called these tiny creatures Animalcules. He soon found the animalcules in the rain water, saliva, vinegar, infusions and other substances. He explained these animalcules with accurate drawings and descriptions.

10. Difference Between Spore and Cyst: -

| Spore of Bacterium | Cyst of Bacterium |
|---------------------------|---------------------------|
| It is heat resistant. | It is not heat resistant. |

11. Four Stages of Growth in Bacteria: -

See Dera Ghazi Khan Board Answer No: 2

12. Mycoplasma: -

1. Mycoplasma is a bacterium which lack cell wall.
It does not have cell wall like other bacteria.

2. It is the smallest known bacterium.

3. One form of pneumonia is due to mycoplasma.
- Or

13. Gram Positive Bacteria: -

1. Bacteria that absorb and retain crystal violet stain in the laboratory are referred to as Gram-Positive Bacteria.

2. They are blue purple after staining with Gram stain.

3. Their cell wall is 20-80 nm thick and consists of one thick layer of peptidoglycan, an additional polysaccharide, the techoic acid, and lipotechoic acid.

4. They produce exotoxin.

5. Their nutritional requirements are relatively complex.

6. They are more susceptible to pencillin and lysozyme and less susceptible to tetracycline.

7. Periplasmic space is presnt in cell wall of some Gram positive bacteria.

8. Amount of cell wall lipid in Gram positive bacteria is 1-4 per cent.

9. Amount of peptidoglycan in their cell wall is 50 per cent.

10. Their ell wall is more permeable.

Examples: Spore forming bacilli and many cocci

14. Nucleoid: -

1. The term nucleoid is often applied to the chromosome region of a bacterial cell (a prokaryotic cell). Other names for nucleoid are nuclear body, chromatin body and nuclear region.

2. It is a dense zone of cytoplasm which is not enclosed by nuclear envelope.

3. It has a single chromosome consisting of an extremely long molecule of DNA that is tightly folded so as to fit in the nucleoid.

4. Nucleoid is visible in the light microscope after staining with Feulgen stain.

15. Differences Between Microbicidal and Microbistatic Effect of Chemicals on Bacteria: -

See Multan Board Answer No: 19

16. Medical Importance of Bacteria: -

They are responsible for many diseases of human beings. They are very common pathogens of humans. Approximately 200 species of bacteria are known to cause diseases in humans. Some of the diseases found in humans due to bacteria are typhoid, diphtheria, tuberculosis, food poisoning etc.

17. Saprophytic Bacteria: -

See Gujranwala Board Answer No: 13 (A)

18. A) Functions of Cell Wall in Bacterial Cell: -

1. It protects the bacterium from osmotic lysis.
2. It determines the shape of the bacterium.

B) Function of and Flagella in Bacterial Cell: -

1. Flagella help in motility of bacterium.
2. They are involved in chemotaxis i.e. they detect and move in response to chemical signals.

Gujranwala Board Questions

1. What is the Ecological Importance of Bacteria? (A-2006)
2. List the various phases on bacterial growth curve? (A-2007)
3. What do you know about Mesosomes? (A-2007)
4. Write a note on Bacterial Nucleoid. (A-2008)
5. What are Streptobacilli? (A-2008)
6. Differentiate between Antiseptics and Disinfectants. (A-2009)
7. Define Water Blooms. What is their effect on animals? (A-2009)
8. What is Plasmid? Give one of its importances. (A-2010)
9. Give two examples of Chemosynthetic Bacteria. (A-2010)
10. Differentiate between Microbicidal and Microbistatic Chemicals. (A-2011)
11. Differentiate between Photosynthetic and Chemosynthetic Bacteria. (A-2011)
12. Describe Asexual Reproduction in *Nostoc*. (A-2012)
13. Define Saprophytic and Parasitic Bacteria. (A-2012)
14. What is nucleoid? (A-2013)

Answers

1. Ecological Importance of Bacteria: -

See Multan Board Answer No: 14

2. List of Various Phases on Bacterial Growth Curve: -

See Mutan Board Answer No: 3

3. Mesosomes: -

See Mutan Board Answer No: 7

4. Bacterial Nucleoid:

See Lahore Board Answer No: 14

5. Streptobacilli: -

Chains of bacterial rods are called Streptobacilli.

Or

Streptobacilli are chains of bacilli.

6. **Differences between Antiseptics and Disinfectants:** -
See Mutan Board Answer No: 16

7. **Water Blooms and their Effect on Animals:** -
See Mutan Board Answer No: 13

8. **A) Plasmid:**
Plasmids are circular, double stranded DNA, self-replicating molecules in addition to chromosomes which are not essential for growth and metabolism.

B) Importances of Plasmid: -
antibiotic
receptive
bacteriocins, a group of
affect human
1. Some plasmids called R factors (resistance factors) carry genes for resistance.
2. Other plasmids allow bacteria to transfer their genetic material to cells in recombination processes.
3. Still other plasmids contain genes for the production of proteins toxic to bacteria, and other genes code for toxins that affect human cells and processes.

9. **Two Examples of Chemosynthetic Bacteria:** -
1. *Nitrosomonas*
2. *Nitrobacter*

10. **Differences Between Microbicidal and Microbistatic Chemicals:** -
See Multan Board Answer No: 19

11. **Differences between Phtosynthetic and Chemosynthetic Bacteria:** -

| Photosynthetic Bacteria | Chemosynthetic Bacteria |
|--|--|
| 1. They utilize light energy to synthesize food in photosynthesis. | 1. They use chemical reactions to obtain energy from inorganic compounds for carbohydrate synthesis. |
| 2. For example, green sulfur bacteria utilize sun light as energy source, carbon dioxide as carbon source and hydrogen sulphide as hydrogen ion source to synthesize carbohydrate. | 2 For example, <i>Nitosomonas</i> convert ammonium ions into nitrite ions under aerobic conditions and in the process obtain ATP. This ATP is then used to fix atmospheric carbon dioxide into carbohydrates in a process known as chemosynthesis. |

12. **Asexual Reproduction in *Nostoc*:** -
Asexual Reproduction in *Nostoc* takes place by following methods.
1. **Hermagonia:**

Hermagonia are portions of filament of *Nostoc* between heterocysts. They help in fragmentation. During favourable conditions, they separate from the filament at heterocysts and end cells of each hermagonium divide to form long filament of *Nostoc*.
 2. **Akinetes:**
 Akinetes are non-motile spores formed from certain vegetative cells during unfavourable conditions. At the approach of favourable conditions, akinetes germinate to form independent filaments by simple division.
 Or
 An akinete is a spore that develops from a cell of *Nostoc* filament that becomes enlarged and filled with food reserves. The spore can remain dormant and then germinate to produce new filament.

13. **A) Saprophytic Bacteria: -**
 The heterotrophic bacteria that feed exclusively on dead organic matter are known as Saprophytic Bacteria. Or
 These are soil bacteria which get their food from dead organic matter in the form of humus.
B) Parasitic Bacteria: -
 The heterotrophic bacteria that feed on living organic matter such as human tissues are known as Parasitic Bacteria. Or
 These are the bacteria which are fully dependent on their host for their nutrition.

14. **Nucleoid: -**
 See Lahore Board Answer No: 14

Rawalpindi Board Questions

- What are Plasmids and their importance? (A-2010)
- Distinguish lag phase from log phase of bacterial growth curve. (A-2010)
- Distinguish between Spores and Cysts in Bacteria. (A-2011)
- Differentiate between Lag Phase and Log Phase of growth in Bacteria. (A-2011)
- What are Plasmids? Give their significance. (A-2012)
- What are Super Blue Green Algae? Give its importance. (A-2012)
- Write two differences between the cell walls of gram positive and gram negative bacteria. (A-2013)

Answers

- Plasmids and their Importance: -**
 See Gujranwala Board Answer No: 8
- Difference Between Lag Phase and Log Phase of Bacterial Growth Curve: -**

| Lag Phase | Log Phase |
|-----------|-----------|
|-----------|-----------|

| | |
|---|--|
| It is the phase of no growth in which bacteria store nutrients, synthesize enzymes and prepare themselves for binary fission. | It is an active stage of growth at which reproduction and growth are at their highest rates. |
|---|--|

3. **Difference Between Spores and Cysts in Bacteria: -**
See Lahore Board Answer No: 10
4. **Differece between Lag Phase and Log Phase of Growth in Bacteria: -**
See Rawalpindi Board Answer No: 2
5. **Plasmids and their significance:**
See Gujranwala Board Answer No: 8
6. **A) Super Blue Green Algae: -**
Super Blue Green Algae are basically expensive pond scum in which a cyanobacterium is a single celled organism that produces its own food through photosynthesis.

B) Importance of Super Blue Green Algae: -
Pond Scum produced by Super Blue Gree Algae serves as complete whole food which contains 60 % protein with all essential amino acids in perfect balance.
7. **Two Differences between the Cell Walls of Gram Positive and Gram Negative Bacteria: -**

| Cell Wall Of Gram Positive Bacteria | Cell Wall of Gram Negative Bacteria |
|--|--|
| 1. The cell wall of Gram positive bacteria have only one layer, a vey thick layer of peptidoglycan about 25 nm wide. There is no outer membrane. Cell wall is is over all 20-80-nm thick. 2. They have an additional polysaccharide known as techoic acid in their cell wall. Lipotichoic acid is also present. | 1. The cell wall of Gram-negative bacteria have two layers, a thin layer of peptidoglycan and a thick outer membrane. Cell wall is over all 6-11 nm thick. 2. They have lipopolysaccharides and lipoprotein in their cell wall. Techoic acid is absent. |

Sargodha Board

Questions

1. State the postulates of Germ Theory of Disease. (A-2010)
2. Differentiate Microbicidal from Microbistatic effect of Chemicals on Bacteria. (A-2010)
3. Give four Postulates of Germ Theory of Disease. (A-2011)

4. Enlist four Taxonomic Group of Bacteria on the basis of presence of Flagella and pattern of attachment of Flagella. (A-2011)
5. Write Physical Methods to control Bacteria. (A-2012)
6. Write classification of Bacteria on the basis of shapes. (A-2012)
7. Write four postulates of Germ Theory of Disease. (A-2012)
8. Differentiate between Gram Positive from Gram Negative Bacteria. (A-2012)
9. Describe four postulates of germ theory. (A-2013)

Answers

1. **Postulates of Germ Theory of Disease: -**
See Mutan Board Answer No: 2
2. **Differences Between Microbicidal and Microbistatic Effect of Chemicals on Bacteria: -**
See Multan Board Answer No: 19
3. **Four Postulates of Germ Theory of Disease: -**
See Mutan Board Answer No: 2
4. **Four Taxonomic Group of Bacteria on the basis of presence of Flagella and pattern of attachment of Flagella: -**
See Multan Board Answer No: 20
5. **Physical Methods to Control Bacteria: -**
To achieve physical control scientists employ heat, radiation, filters, and other physical agents to remove microorganisms from instruments, equipment and fluids. Physical methods are actually designed to achieve sterilization i.e. destruction or removal of all forms of life. Or
In physical methods, steam, dry heat, gas, filtration and radiation are used to control bacteria. The process in which we use physical agents to control bacteria / microorganisms is known as sterilization process. Sterilization is destruction of all life forms.
6. **Classification of Bacteria on the Basis of Shapes: -**
On the basis of shapes, bacteria are classified into following three categories.
 1. **Cocci:**
 1. A bacterial sphere is known as coccus. A coccus is approximately 0.5 um in diameter, usually round, but it may also be oval, elongate, or intended on one side.
 2. Those cocci that remain together in pairs after reproducing are called diplococci.
 3. Those cocci consisting of chains of diplococci are called streptococci.
 4. An other variation of cocci is tetrad, a square of four cocci.
 5. Still an other variation of cocci is sarcina. The sarcina is a cube like packet of eight cocci.
 6. Certain cocci divide randomly and form an irregularl grape like clusters of cells called a staphylococcus.

2. **Bacillus: -**
 1. As coined by Muller, rod is known as bacillus. In various species of bacteria bacillus may be as long as 20 μm or as short as 0.5 μm . Certain rods are slender, others are rectangular, still others are club-shaped.
 2. Bacilli in pairs are called diplobacilli.
 3. Some rods form long chains and are called streptobacilli.
3. **Spiral:**
 1. It is the helical or spiral shape of bacterial organisms.
 2. Certain spiral bacteria called vibrios are curved rods resemble comma under the microscope.
 3. Other spiral bacteria called spirilla have a screw shape with a rigid cell wall and flagella that assist movement.
 4. Still other bacteria known as spirochetes, have a flexible cell wall but no flagella.

Or

 1. **Cocci:**
A bacterial sphere is known as coccus. A coccus is approximately 0.5 μm in diameter, usually round, but it may also be oval, elongated or intended on one side.
 2. **Bacillus: -**
As coined by Muller, rod is known as bacillus. In various species of bacteria bacillus may be as long as 20 μm or as short as 0.5 μm . Certain rods are slender, others are rectangular, still others are club-shaped.
 3. **Spiral:**
It is the helical, cork screw shaped, comma or spiral shaped bacterial organisms.

7. **Four Postulates of Germ Theory of Disease: -**

See Mutan Board Answer No: 2

8. **Differences Between Gram Positive from Gram Negative Bacteria: -**

See Bahawalpur Board Answer No: 11

9. **Four Postulates of Germ Theory of Disease: -**

See Mutan Board Answer No: 2

Faislabad Board

Questions

1. What is Tetrad Arrangement in Cocci Bacteria.? (A-2007)
2. Name a bacterium that has no Cell Wall. (A-2007)
3. Give importance of Cyanobacteria. (A-2007)
4. Write down the postulates of Robert Koch about Germ Theory of Disease. (A-2008)
5. Differentiate between Antiseptics and Disinfectants. (A-2008)
6. What is Humus? How do soil inhibiting bacteria absorb it? (A-2009)
7. What is Water Bloom? Give its effect. (A-2009)
8. Name four distinct phases in the bacterial growth curve. (A-2011)
9. What are Lophotrichous Bacteria? (A-2011)
10. What are Mesosomes? (A-2012)
11. What are Microaerophilic Bacteria? (A-2012)

12. What are gram negative bacteria? (A-2013)

Answers

1. Tetrad Arrangement in Cocci Bacteria: -

A tetrad is square of four cocci. When the division of a cell is in two planes, it will produce a tetrad.

2. Bacterium that has no Cell Wall: -

Mycoplasma is the bacterium which has no cell wall.

3. Importance of Cyanobacteria: -

See Mutan Board Answer No: 12

4. Postulates of Robert Koch about Germ Theory of Disease: -

See Mutan Board Answer No: 2

5. Difference Between Antiseptics and Disinfectants: -

See Mutan Board Answer No: 16

6. A) Humus -

Humus is a material resulting from partial decay of plants and animals.

B) Absorption of Humus by Soil Inhabiting Bacteria: -

Many soil inhabiting bacteria have very extensive enzyme systems that break down complex substances of humus to simpler compounds. The bacteria can then absorb and utilize these simple substances as a source of energy.

7. Water Bloom and its Effect: -

See Mutan Board Answer No: 13

8. Name of Four Distinct Phases in the Bacterial Growth Curve: -

See Mutan Board Answer No: 3

9. Lophotrichous Bacteria: -

These are the bacteria which have a group of two or more flagella at their one pole.

10. Mesosomes: -

See Mutan Board Answer No: 7

11. Microaerophilic Bacteria: -

Some bacteria require a low concentration of oxygen for growth are known as Microaerophilic Bacteria.

12. Gram Negativ Bacteria: -

1. The bacteria which do not retain crystal violet when rinsed with alcohol are known as Gram negative bacteria.
2. They appear as orange or red
3. Their cell wall is 8-11 nm thick and consists of thin layer of peptidoglycan (only 10 %), lipopolysaccharides and lipoprotien. Lipid contents are 11-12 %. Cell wall is also surrounded by an outer membrane.
8. They are more susceptible to tetracycline and less susceptible to pencillin and lysozyme.

Example: -Many intestinal bacilli and few cocci

Chapter No: 7 4 SQs Multan Board

Questions

1. Give characters of Kingdom Protista. (A-2007)
2. What are the distinguishing characters of Kingdom Protista? (Module Paper 2006-08)
3. Write down the features of Ciliates. (A-2008)
4. What are Diatoms? (A-2008)
5. Name two important Zooflagellates and what is their disease causing role? (S-2008)
6. Give two differences between Fungus like Protists and Fungi. (A-2009)
7. What is Trichonympha? (A-2009)
8. What are Diatoms? (A-2009)
9. Give role of Tsetse fly as vector in the transmission of a specific disease. (S-2009)
10. What do you know about Oomycetes? (S-2009)
11. Why is it considered that Plants arose from Green Algae? (A-2010)
12. How Algae are different from Plants? (S-2010)
13. What is *Chlorella*? Give its significance. (S-2010)
14. How Fungus like Protists differ from Fungi? (A-2011)
15. Why *Pleomyxa palustris* may be the most primitive of all Eukaryote like forms? (A-2011)
16. Why is *Chlorella* important and what is its habitat? (S-2011)
17. Differentiate between Choanoflagellates and Trichonymphas. (A-2012)
18. How do ciliates differ from other Protozoans? (A-2012)
19. What are Diatoms? Give their importance. (A-2013-New)
20. Differentiate between Fungi and Fungus-like Protists. (A-2013-New)
21. Write the Ecological importance of Dinoflagellates. (A-2013-New)
22. Basically the kingdom protista is defined by exclusion. How? (A-2013-New)
23. Compare Foraminiferan and Actinopod Shells. (A-2013-Old)
24. Enlist two characters of Apicomplexans. (A-2013-Old)

Answers

1. Characters of Kingdom Protista: -

1. They are eukaryotes that are not fungi, plants or animals.
2. Many are unicellular, but numerous colonial and multicellular groups exist.
3. Most are microscopic, but some are very large.
4. They represent all symmetries.
5. They exhibit all types of nutrition.
6. Some protists are surrounded by a plasma membrane, all others have plasma membrane with extracellular material deposited on the outside of membrane. Some have strong cell wall while still some have glassy shells of silica and calcium carbonate.
7. Protists, most of which are motile at some point in their life cycle, have various means of locomotion. They may move by pseudopodia, by flexing individual cells, by gliding over surfaces, by flagella, by cilia and some by pseudopodia and flagella both.

8. Reproduction is varied in kingdom Protista. Almost all protists rereproduce asexually, and many also reproduce sexually, often by sangamy, the union of gametes. However most protists do not develop multicellular reproductive organs, nor do they form embryos.

2. Distuignishing Characters of Kingdom Protista -

1. They are eukaryotes that are not fungi, plants or animals.
2. Many are unicellular, but numerous colonial and multicellular groups exist.
3. Most are microscopic, but some are very large.
4. Most protists do not develop multicellular reproductive organs, nor do they form embryos.

3. Features of Ciliates: -

1. Most ciliates feture large numbers of cilia which are usally arranged in longitudinal rows or spirals around the cell. The cilia beat with such precise coordination that organisms can back up and turn around as well as move forward.
2. Not all ciliates are motile. Some sessile forms have stalk, and others, although capable of some swimming , are more likely to remain attached to a rock or other surface at one spot. These cilia set up water currents that draw food toward them.
3. Ciliates have a tough but flexible outer covering called the pellicle that enables them to squeeze through or move around obstacles.
4. All known ciliates have two different types of nuclei within their cells—small micronuclei and larger macronuclei. Macronuclei control normal metabolism of the cells, while the micronuclei are concerned with reproduction.
5. Most ciliates are holozoic. They form food vacuoles for ingesting food.
6. The majority of ciliates are free-living, however, several are parasitic.
7. They form contractile vacoules for regulating water balance.
8. Most ciliates are capable of a sexual process called conjugation, in which two individuals come together and exchange genetic material.

Or

1. Most ciliates feture large numbers of cilia which are usally arranged in longitudinal rows or spirals around the cell. The cilia beat with such precise coordination that organisms can back up and turn around as well as move forward.
2. Ciliates have a tough but flexible outer covering called the pellicle that enables them to squeeze through or move around obstacles.
3. Most ciliates are capable of a sexual process called conjugation, in which two individuals come together and exchange genetic material.

4. Diatoms: -

1. Most diatoms are unicellular although few exist as colonies.
2. The cell wall of each diatom consists of two shells that overlap where they fit together, much like a petri-dish. Silica is deposited in the shell, and this glass like

- material is laid down in intricate patterns.
3. There are two basic groups of diatoms those with radial symmetry and those with bilateral symmetry.
 4. Diatoms contain the photosynthetic pigments chlorophyll a and c and carotenoids, including fucoxanthin. Their pigment composition gives them a yellow or brown color.
 5. Diatoms most often reproduce by mitosis.
 6. Diatoms are common in fresh water, but they are especially abundant in relatively cool ocean water. They are also found in soil environments.
 7. Diatoms are the major producers in the aquatic (marine and freshwater) ecosystems because of their extremely large numbers. Diatoms are very important in aquatic food chains.

5. **Name of Two Zooflagellates and Their Disease Causing Role: -**

1. ***Trypanosoma***-Its two species are transmitted by tsetse fly and cause sleeping sickness in Africa, in which parasites first entere into the blood stream, into lymphatic system and then in the brain. As the trypanosomes invade brain, the patient slips into coma and dies.
2. ***Leishmania***It is trnasmitted by sand flies, causes skin sore and in some case can infect macrphages of liver, spleen and bone marrow often resulting in fatal pneumonia.

6. **Two Differences Between Fungus like Protists and Fungi: -**

| Protists | Fungus like | Fungi |
|---------------------------------------|--------------------|------------------------------------|
| 1. They have centrioles. | | 1. They lack centrioles. |
| 2. They have cell walls of cellulose. | | 2. They have cell walls of chitin. |

7. **Trichonympha: -**
Trichonympha is a specialized zooflagellate with hundreds of flagella, that lives in the gut of termite and wood-eating cockroach. Trichonympha ingests wood chips and rely on endosymbiotic bacteria to digest cellulose in the wood that termite or roach eats. The termite or roach, trichonympha and bacteria obtain nutrients from this source. This is an excellent example of mutualism.

8. **Diatoms: -**
See Multan Board Answer No: 4

9. **Role of Tsetse Fly as Vector in the Transmission of a Specific Disease: -**
Trypanosoma circulating in the blood and present in the tissue fluid of sleeping sickness patient are picked up by female Tse-Tse fly when they take a blood meal. Within the fly

Trypanosoma move to the mid gut from where they divide and migrate to salivary glands.

When the fly takes another blood meal it injects parasites into the blood of normal person along with its saliva.

10. Oomycetes (or Water Molds): -

1. Oomycetes, commonly known as water molds, usually live in the water where they also live on land and parasitize insects and plants.
2. They have a net work of filaments or hyphae that are coenocytic having no septa or cross walls. Their cell walls are largely composed of cellulose.
3. They are diploid fungus like protists which produce motile, flagellated 2n spores by meiosis called zoospore during asexual reproduction and produce haploid gametes during sexual reproduction.
4. A water mold, *Phytophthora infestans*, was responsible for 1840s potato famine in Ireland.
- Or
1. Most species are aquatic.
2. They have diploid cells during most of their life cycle.
3. Their cell walls have cellulose and lack chitin.
4. Their mycelium has coenocytic hyphae.
5. During asexual process of reproduction, they form zoospore, a flagellated motile spore which germinates to new mycelium.
6. During asexual reproduction, they form clusters of egg like bodies at the tips of hyphae.
7. Nuclear fusion leads to the formation of sexual spores called oospore, which germinate to produce new hyphae.

Example: *Phytophthora infestans*, was responsible for 1840s potato famine in Ireland.

11. Plants Arose from Green Algae: -

Like land plants, green algae have cellulose cell walls and store food as starch. Green algae also have the same types of pigments (chlorophyll a, b and carotenoids) as do plants. Biologists believe that land plants evolved from green algae. Evidence from RNA sequencing also indicates that green algae and land plants form a monophyletic lineage.

12. Algae Different from Plants: -

| Algae | Plants |
|--|---|
| 1. They have unicellular sex organs. | 1. They have multicellular sex organs. |
| 2. Fertilization is external. | 2. Fertilization is internal within the female body. |
| 3. Zygote is not protected by the parent body and it does not develop into embryo. | 3. Plant zygote grows into multicellular embryo that is |

| | |
|--|-------------------------------|
| | protected by parental tissue. |
|--|-------------------------------|

13.

A)

Chlorella

 - It is a fresh water, unicellular, non-motile, solitary, alga found floating in stagnant water of ponds, pools, ditches etc.
 - Its body is spherical which contains a single nucleus and a cup shaped chloroplast usually without pyrenoid.

B)

Significance of *Chlorella*: -

 - It is easily cultured and has been used as an experimental organism in research on photosynthesis.
 - It is being investigated as an alternate source of food.
14.

Fungus like Protists Different from Fungi: -

See Multan Board Answer No: 6
15.

***Pleomyxa palustris*, the most primitive of all Eukaryote like Forms:** -

Pleomyxa palustris may be the most primitive of all Eukaryote like forms because they have multiple membrane bounded nuclei but none of the other organelles found in all other eukaryotes.

Or

They may be the most primitive of all Eukaryote like forms because they lack both mitochondria and endomembrane system but they do have nuclei and rudimentary flagella. They compensate their lack of mitochondria by harbouring numerous endosymbiotic bacteria that apparently perform oxidative phosphorylation for the host.
16.

A)

Importance of *Chlorella*: -

As it is easily cultured, hence it has been used as an experimental organism in research on photosynthesis as well as being investigated as an alternate source of food.

B)

Habitat of *Chlorella*: -

Stagnant water of ponds, pools and ditches.

Fresh water ponds and ditches.

Or

Or

It is widespread in both freshwater and salt water as well as in soil.
17. Differences Between Choanoflagellates and Trichonymphas: -
- | Choanoflagellates | Trichonymphas |
|---|--|
| <ol style="list-style-type: none"> They are free living marine and fresh water zooflagellates. They are colonial and sessile. Each colony is permanently attached by a thin stalk to bacteria rich debris. Each cell is 5 to 10 um long with a collar of microvilli and a single flagellum. | <ol style="list-style-type: none"> They live as symbionts in the guts of termites. They are solitary and free swimming. Each cell has hundreds of flagella. They have bacteria in them that digest the cellulose in the wood that termites eat. |
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| | |
|--|---|
| <p>3. They obtain food by waving their flagella causing water currents to carry bacteria and other small particles of food into the collar of microvilli.</p> <p>4. They have evolutionary significance as their cells resemble collar cells of sponges.</p> | <p>4. They do not have any evolutionary significance.</p> |
|--|---|

18. Ciliates differ from other Protozoans:

| Ciliates | Other Protozoan |
|---|---|
| <p>1. All known ciliates have two different types of nuclei within their cells—small micronuclei and larger macronuclei. Macronuclei control normal metabolism of the cells, while the micronuclei are concerned with reproduction.</p> <p>2. Most ciliates are capable of a sexual process called conjugation, in which two individuals come together and exchange genetic material.</p> | <p>1. All other prozoans have a single nucleus.</p> <p>2. The process of conjugation is absent in other protozoans.</p> |

Or

Ciliates differ from all other protozoans in having two kinds of nuclei. One or two small diploid micronuclei that function in sexual process and a large polyploid macronucleus that controls cell metabolism and growth.

19. A) Diatoms: -

Most diatoms are unicellular although few exist as colonies. The cell wall of each diatom consists of two shells that overlap where they fit together, much like a petri-dish. Silica is deposited in the shell, and this glass like material is laid down in intricate patterns.

B) Importance of Diatoms: -

Diatoms are the major producers in the aquatic system (marine and freshwater) ecosystems because of their extremely large numbers. Diatoms are very important in equatic food chains.

20. Differences between Fungi and Fungus-like Protists: -
See Multan Board Answer No: 6

21. Ecological Importance of Dinoflagellates: -

1. Ecologically, they are one of the most important groups of producers (second only to diatoms) in marine ecosystem.
2. Dinoflagellates are known to have occasional population explosions or blooms. These blooms frequently color the water orange, red or brown and are known as red tides.

Or

1. Ecologically dinoflagellates are important producers (second to diatoms) in marine ecosystem.
2. A few dinoflagellates are known to have occasional population explosions, or blooms. These blooms, which frequently color coastal water orange, red, or brown, are known as red tides. Some dinoflagellates that form red tides produce a toxin that attacks the nervous system of fishes, leading to fish kills. Birds sometimes die when exposed to toxin by eating dead fish. About 30 species of dinoflagellates produce toxins that move through food chains via shellfish to humans.

22. Kingdom Protista defined by Exclusion:

Basically the kingdom protista is defined by exclusion because all members have characteristics that exclude them from other four kingdoms.

23. Comparison of Foraminiferan and Actinopod Shells: -

| Foraminiferan Shells | Actinopod Shells |
|---|---|
| 1. Shells or tests of foraminiferans are made of calcium carbonate. | 1. Their shells or tests are made of silica. |
| 2. Many chambered shell with pores is exoskeleton which covers the plasma membrane. Pseudopods extend through openings in the test. | 2. Test or shell is internal or endoskeleton and cytoplasm covers it. The pseudopods are external to the shell. |
| 2. Dead foraminiferans settle on the bottom of the ocean, where their tests form a grey mud that is gradually transformed into chalk creating vast lime stone deposits of the past. | 3. When actinopods die, their shells settle and become an ooze (sediment) that can become several meters thick on the oceans floor. |

24. Two Characters of Apicomplexans: -

1. Apicomplexans lack specific structures for locomotion (cilia, flagella or pseudopodia). They move by flexing.
 2. They have an apical complex of microtubules that attaches the parasite to its host.
- The apical complex is only visible using electron microscopy.

Bahawalpur Board

Questions

1. What is Chalk? (A-2007)
2. What are the major characteristics of Kingdom Protista? (A-2007)
3. Which type of locomotion is found Apicomplexans and Amoebas? (A-2008)
4. Give two examples of Chlorophyta. (A-2009)
5. Why Phytophthora is important in human history? (A-2009)
6. How Ciliates differ from other Protozoans? (A-2011)
7. What is Chlorell? Give its significance. (A-2011)
8. What are Kelps? (A-2012)
9. Write two differences between Fungus like Protists and True Fungi (A-2012)
10. Write a note on Diatoms. (A-2013)
11. Write two characters of Slime Molds. (A-2013)
12. What are Zooflagellates? (A-2013)
13. Write down the economic importance of Oomycetes. (A-2013)

Answers

1. **Chalk:**

Chalk is the past dead remains of foraminiferans with shells or tests of calcium carbonate that sank into the bottom of oceans. Foraminiferans flourished during the Paleozoic era about 225 million years ago. There are vast lime deposits or chalk deposits in the oceans.

Geological upthrust has brought these deposits to the surface in several places around the world such as White Cliffs of Dover along the southern coast of England.

Or

Dead foraminiferans sink to the bottom of the ocean where their shell form a grey mud that is gradually transformed into chalk. Foraminiferans of the past have created vast limestone or chalk deposits.

2. **Major Characteristics of Kingdom Protista: -**

See Multan Board Answer No: 1 or 2

3. **Type of Locomotion Found in Apicomplexans and Amoebas: -**

Flexing movement is found in Apicomplexans and amoeboid movement with pseudopodia is found in Amoebas.

4. **Two Examples of Chlorophyta: -**

1. *Chlamydomonas*
2. *Ulva*

5. **Phytophthora Important in Human History: -**

Phytophthora infestans, which causes late blight of potatoes, destroyed potato crops in the 1840s in Ireland. Potatoes, which were introduced from South America had become the

staple food of workers in Europe. The average farm workers ate 5 kilo potatoes every day. However, due to cool, damp summer weather, the potatoes became infected with *Phytophthora infestans* and all rotted. During the resultant famine, one million people perished, prompting many Irish to seek a new life in the United States and Australia.

Or

Phytophthora infestans was the cause of Irish potato famine of the 19th century. It causes

a disease commonly known as late blight of potatoes. Because of several summers in

Ireland in the 1840s, the water mold multiplied unchecked, causing potato tubers to rot

in the fields. Since potatoes were the staple of Irish peasants diet, many people (25000 to

more than one million) starved to death. The famine prompted a mass migration out of

Ireland to such countries as the United States.

Or

Phytophthora infestans, which causes late blight of potatoes, was responsible for the Irish

Potato famine of 1845 and 1847. During the famine, about one million people starved to

death or died of diseases complicated by starvation. Millions of Irish people emigrated to

the United States and elsewhere as a result of this disease.

6. Ciliates Different from other Protozoans: -

See Multan Board Answer No: 18

7. Chlorella and its Significance: -

See Multan Board Answer No: 13

8. Kelps: -

The largest brown algae called kelps are tough and leathery in appearance. They possess

leaf like *blades*, stem like *stipes*, and root like anchoring *holdfast*. Example: *Laminaria*

Or

1. Kelps are giant brown algae which are tough and leathery in appearance.
2. They are exclusively marine and may grow along the shore line. In deeper waters,

giant kelps often grow extensively in vast beds.

3. The large thallus of kelp is differentiated into a leaf like *blades* in which most

photosynthesis occurs, stem like *stipes* and a root like *holdfast*, which attaches the

substrate.

4. They often have gas filled bladders that provide buoyancy.

9. Two Differences Between Fungus like Protists and True Fungi: -

See Multan Board Answer No: 6

10. A Note on Diatoms: -

See Multan Board Answer No: 4

11. Two Characters of Slime Molds: -

1. They have plasmodium, a feeding stage, which is a naked mass of cytoplasm of about

- 30 cm (1 ft) in diameter having many nuclei.
2. They produce haploid spores by meiosis within stalked sporangia during unfavorable conditions.

12. Zooflagellates: -

See Dera Ghazi Khan Board Answer No: 5

13. Economic Importance of Oomycetes: -

Oomycetes cause many disease in vegetables. The most important oomycete is *Phytophthora infestans*, which causes late blight of potatoes. This is a havoc to potato crop and causes sufficient damage to the potato crop in the field. It was responsible for the Irish Potato famine of 1845 and 1847.

Dera Ghazi Khan Board

Questions

1. Give at least two examples of Dinoflagellates. Which pigments are found in them? (A-2008)
2. How Algae are different from Plants? (A-2008)
3. How do Ciliates differ from other Amebae? (A-2009)
4. Why Euglenoids are placed in Algae and Protozoans? (A-2009)
5. What are Zooflagellates? Give two examples. (A-2010)
6. What is *Chlorella*? Give its uses. (A-2010)
7. On what principles Protists are grouped together? (A-2011)
8. Draw the life cycle of *Plasmodium*. (A-2011)
9. On what principles Protists are grouped together? (A-2011)
10. Differentiate between tests of foraminiferans and actinopods. (A-2013)
11. Give two characters of ciliates. (A-2013)
12. What are Kelps? Give its parts. (A-2013)
13. Give the structure of diatoms. (A-2013)

Answers

1. A) Two Examples of Dinoflagellates: -

1. *Ceratium*
2. *Gonyaulax*

B) Pigments Found in Dinoflagellates:

Chlorophyll a, chlorophyll b, carotenes including Fucoxanthin

2. Algae Different from Plants: -

See Multan Board Answer No: 12

3. Ciliates Different from other Protozoans: -

See Multan Board Answer No: 18

4. Euglenoids Placed in Algae and Protozoans: -

1. Euglenoids are placed in algae because they have chlorophyll a and b and yellow and orange carotenoids similar to green algae and plants.
2. Euglenoids are placed in protozoans because they are closely related to zooflagellates based on molecular data.

5. A) Zooflagellates: -

1. Zooflagellates are mostly heterotrophic, unicellular (a few are colonial) protests with spherical or elongated bodies.
2. They move rapidly by lashing one to many long, whip like flagella which are usually located at the anterior end.
3. Some zooflagellates ingest living or dead organisms by means of a definite mouth or oral groove. Other obtain their food by absorbing nutrients from dead or decomposing organic matter.
4. They include free living, symbiotic and parasitic species.

B) Two Examples of Zooflagellates: -

1. *Trypanosoma*
2. Choanoflagellates

6. Chlorella and Uses: -

See Multan Board Answer No: 13

7. Protists are grouped together on following principles.

1. All protists are eukaryotes and have evolved from prokaryotes.
2. Other eukaryotic kingdoms have their evolutionary origin in the kingdom Protista and arose from protists in various ways.
3. All members of protista have characteristics that exclude them from the other four kingdoms.

8. Life Cycle of Plasmodium: -

9. Differences Between Tests of Foraminiferans and Actinopods: -

See Multan Board Answer No: 13

10. Two Characters of Ciliates: -

1. All known ciliates have two different types of nuclei within their cells—small micronuclei and larger macronuclei. Macronuclei control normal metabolism of the cells, while the micronuclei are concerned with reproduction.
2. Most ciliates are capable of a sexual process called conjugation, in which two individuals come together and exchange genetic material.

11. Kelps and its Parts: -

12. Structure of Diatoms:

Diatoms have a unique silica cell wall which consists of two shells that overlap where they fit together, much like a petri-dish. Silica is deposited in the shell, and this glass like material is laid down in intricate patterns.

Lahore Board Questions

1. What is Giant Amoeba? (A-2007)
2. What are Foraminiferans and Actinopods? (A-2007)
3. What are Limestone Deposits? How are they formed? (A-2008)
4. Write the two Characteristics of Ciliates. (A-2008)
5. What are Trichonymphas? (A-2009)
6. What is chemical composition of shells of Foraminiferans and Actinopods? (A-2009)
7. Name four major groups of kingdom Protista. (A-2010)
8. What are the functions of Micronucleus and Macronucleus in Ciliates? (A-2010)
9. Write down three characters of Giant Amoeba. (A-2011)
10. Define Dinoflagellates. (A-2012)
11. What are Water Molds? (A-2012)
12. What do you know about giant amoeba? (Group I-A-2013)
13. What is chlorella? (Group I-A-2013)
14. What is conjugation? (Group I-A-2013)
15. Give any two points for the importance of algae. (Group I-A-2013)
16. Write down two similarities and differences between fungi and fungus like protests. (Group II-A-2013)
17. Write down two characteristics of apicomplexans. (Group II-A-2013)
18. Write two benefits each of algae and fungi. (Group II-A-2013)
19. Write down two characteristics of ciliates. (Group II-A-2013)

Answers

1. Giant Amoeba: -

1. Giant amoeba *Pelomyxa palustris* may be the most primitive of all eukaryotic like forms.
2. It lacks both mitochondria and an endomembrane system but has multiple membrane-bound nuclei.
3. It obtains energy from metanogenic bacteria (bacilli that produce large quantities of methane in their metabolism) which reside inside it.
4. It lives only at the bottom of ponds where oxygen is fairly scarce.
5. It contributes to the degradation of organic molecules.

2. A) Foraminiferans:-

1. Foraminiferans are mostly marine heterotrophs which occur in great abundance both in plankton and on the sea bed down to 10000 meter deep.
2. They produce calcareous (CaCO_3) shells also known as tests. Sometimes the shells can incorporate sand grains.

multiple
million years
where their
Or
calcium
projections
Dead
gray mud
created a

3. Tests or shells are exoskeleton over the plasma membrane and have chambers with pores through which pseudopodia extend.
4. Foraminiferans flourished during the Paleozoic era about 225 million years ago. Dead foraminiferans settled down on the bottom of the ocean where their tests formed a gray mud that was gradually transformed into chalk.

Foraminiferans are marine protozoans which produce shell or test of carbonate. The shells or tests contain pores through which cytoplasmic projections can be extended that form a sticky, interconnected net that entagles prey. Dead foraminiferans sink to the bottom of the ocean where their shells form a gray mud that is gradually transformed into chalk. Foraminiferans of the past have created vast limestone deposits.

B) Actinopods: -
Actinopods are marine protozoans which produce shell or test made of silica. Rodiolarians are actinopods with glassy shells. Or
tests of
Tests are
Unicellular algae
or axopods.
products of
radial
settle, they
floor. This

1. Actinopods are mostly plankton organisms which produce shells or tests of silica.
2. They have long filamentous cytoplasmic projections called axopods. internal while pseudopods (axopods) are external to the test. and other prey become entangled in these cytoplasmic projections
3. Many actinopods contain algal endosymbionts that provide with products of photosynthesis.
4. Some actinopods such as radiolarians have glassy silicon tests with radial arrangement of spines.
5. When radiolarians and other actinopods die, their shells or tests settle, they form several meter thick layer of an ooze (sediment) on the ocean floor. This layer is deeper than the foraminiferans.

3. A) Limestone Deposits: -
Limestone Deposits are thought to be composed of the remains of the foraminiferans in the bottom of the oceans million of years ago. Or
Forminiferans of the past have created vast Limestone Deposits.

B) Formation of Limestone Deposits:
Foraminiferans flourished during the Paleozoic era about 225 million years ago. Dead foraminiferans settled down on the bottom of the ocean where their tests formed a gray mud that was gradually transformed into chalk. With geological uplifting these Limestone Deposits became a part of the land, like White Cliffs of Dover in England.

4. **Two Characteristics of Ciliates:** -
See Dera Ghazi Khan Board Answer No: 10
5. **Trichonymphas:** -
See Multan Board Answer No: 7
6. **Chemical Composition of Shells of Foraminiferans and Actinopods:** -
Shells of Foraminiferans are chemically composed of calcium carbonate and Actinopods are chemically composed of silica.
7. **Name of Four Major Groups of Kingdom Protista:** -
 1. **Protozoa** --Animal like Protists
 2. **Algae** Plant like Protists
 3. **Slime Molds**--Fungus like Protists
 4. **Water Molds**—Fungus like Protists
8. **A) Function of Micronucleus in Ciliates:** -
Micronucleus in ciliates functions in sexual process.
B) Functions of Macronucleus in Ciliates: -
Macronucleus in ciliates controls cell metabolism and growth.
9. **Three Characters of Giant Amoeba:** -
 1. It has multiple membrane-bound nuclei.
 2. It lacks all other organelles found in eukaryotes.
 3. It obtains energy from metanogenic bacteria (bacilli that produce large quantities of methane in their metabolism) which reside inside it.

Or

 1. It has multiple membrane-bound nuclei.
 2. It lacks both mitochondria and an endomembrane system.
 3. It contributes to the degradation of organic molecules.
10. **Dinoflagellates:** -
Dinoflagellates are unicellular unusual algae with two flagella, the cells of which are often covered with shells of interlocking cellulose plates impregnated with silicates.
Or
They are mostly uni-cellular algae, cells are often covered with shells of interlocking cellulose plates impregnated with silicates. Cells have one posteriorly directed flagellum plus a unique transverse flagellum positioned in a girdle encircling the cell.
Or
 1. Most of dinoflagellates are unicellular, although a few are colonial.
 2. Most dinoflagellates are photosynthetic and possess chlorophyll a and c and carotenoids, including fucaxanthin, a yellowish brown carotenoid. However a number of dinoflagellates are colorless, some of these ingest other microorganisms for food.
 3. Many dinoflagellates are endosymbionts that live in the bodies of marine invertebrates such as molluscs.
 3. The cell is usually bounded by protective cellulose plates impregnated with silicates.
 4. Typically they have two flagella, one lies in the longitudinal groove with its distal end free, and the other lies in a transverse groove that encircle the organism.

5. Reproduction in dinoflagellates is primarily asexual by mitosis although a few species reproduce sexually.
6. They are one of the most important groups of producers (second only to diatoms) in marine ecosystem.

11. Water Molds: -

See Multan Board Answer No: 10

12. Giant Amoeba: -

See Lahore Board Answer No: 1

13. Chlorella: -

See Multan Board Answer No: 13

14. Conjugation: -

Conjugation is a type of sexual process in ciliate and bacteria in which genetic material

passes from one cell into another cell during a period of contact.

The term conjugation is used in two related meanings. Or

1. It is a sexual process in certain protists that involves exchange or fusion of one cell with

another cell.

2. It is a mechanism for DNA exchange in bacteria that involves cell-to-cell contact.

Or

It is a temporary union of two unicellular organisms, during which genetic material is

transferred from one cell to other. It occurs in bacteria, protists (usually ciliates) and certain

algae and fungi. Or

Most ciliates are capable of a sexual process called conjugation. During conjugation two

individuals come together and exchange genetic material.

15. Two Points for the Importance of Algae: -

1. Algae are the major producers of the ecosystem, thus they play a basic role in food

chains, providing food and oxygen to other organisms.

2. Some algae such as kelps are edible and may be used to overcome shortage of food in the world.

16. A) Two Similarities between Fungi and Fungus like Protists: -

1. Both are not photosynthetic and absorptive heterotrophs.

2. Both have bodies formed of thread like structures called hyphae.

B) Two Differences between Fungi and Fungus like Protists: -

1. Fungi lack centrioles while fungus like protists have centrioles.

2. Fungi have cell walls of chitin while fungus like protists have cell walls of cellulose.

17. Two Characteristics of Apicomplexans: -

See Multan Board Answer No: 24

18. A) Two Benefits of Algae: -

1. They are major producers of aquatic ecosystem.

2. Marine algae are the source of many useful substances such as algin, agar,

carragenans and antiseptics.

B) Two Benefits of Fungi: -

1. They are very important as decomposers and, along with bacteria, play a vital role in the recycling of iorganic nutrients in the ecosystem.
2. As symbionts, mycorrhizal fungi improve growth of 95 % of vascular plants.

19. Two Characteristics of Ciliates: -

See Dera Ghazi Khan Board Answer No: 10

Gujranwala Board

Questions

1. Differentiate between Diatoms and Dinoflagellates. (A-2006)
2. What are Dinoflagellates? (A-2007)
3. Give two examples of Unicellular Green Algae. (A-2008)
4. Write two charaters of Ciliates. (A-2008)
5. What is Giant Amoeba? (A-2009)
6. Why Phytophthora infestan was famous for? (A-2009)
7. What is Red tide? (A-2010)
8. Describe the Nuclei of Ciliates. (A-2010)
9. Write down three characters of Diatoms. (A-2011)
10. What do you know about Green Algae? (A-2012)
11. What do you know about Foraminiferans and Actinopods? (A-2012)
12. What is meant by polyphyletic group of organisms? (A-2013)
13. What is thallus? (A-2013)
14. What are chaonoflagellates? (A-2013)
15. What is the function of pellicle in ciliates? (A-2013)

Answers

1. Differences between Diatoms and Dinoflagellates: -

| Diatoms | Dinoflagellates |
|--|--|
| 1. They are major producers in aquatic (marine and freshwater) ecosystems. | 1. They are producers second to diatoms in marine ecosystem. |
| 2. The cell wall of each diatom consists of two shells that overlap where they fit together, much like a petri-dish. Silica is deposited in the shell. | 2. The cell is usually bounded by protective cellulose plates impergenated with silicates. |
| 3. They lack flagella. | 3. Typically they have two flagella. |

2. Dinoflagellates: -

See Lahore Board Answer No: 10

3. Two Examples of Unicellular Green Algae: -

See Bahawalpur Board Answer No: 4

4. Two Charaters of Ciliates: -

See Dera Ghazi Khan Board Answer No: 10

5. **Giant Amoeba: -**
See Lahore Board Answer No: 1
6. ***Phytophthora infestans* Famous For: -**
See Bahawalpur Board Answer No: 5
7. **Red Tide:**
Red Tide is an occasional population explosion or bloom of few dinoflagellates which frequently colors coastal water orange, red, or brown. Some dinoflagellates that form red tide produce a toxin that attacks the nervous system of fishes, leading to fish kills. Birds sometimes die when exposed to toxin by eating dead fish. About 30 species of dinoflagellates produce toxins that move through food chains via shellfish to humans.
8. **Nuclei of Ciliates: -**
All known ciliates have two different types of nuclei within their cells—one or more small diploid micronuclei and a larger polyploid macronucleus. Macronucleus controls normal metabolism and growth of the cells, while the micronuclei are concerned with reproduction.
9. **Three Characters of Diatoms: -**
 1. The cell wall of each diatom consists of two shells that overlap where they fit together, much like a petri-dish. Silica is deposited in the shell, and this glass like material is laid down in intricate patterns.
 2. Diatoms contain the photosynthetic pigments chlorophyll a and c and carotenoids, including fucoxanthin. Their pigment composition gives them a yellow or brown color.
 3. Diatoms are the major producers in the aquatic (marine and freshwater) ecosystems because of their extremely large numbers. Diatoms are very important in aquatic food chains.
10. **Green Algae: -**
 1. Majority of green algae are unicellular, however, filamentous, colonial and multicellular forms also exist.
 2. They inhabit a variety of environments including oceans, freshwater environments, snowbanks, the bark of trees, and backs of turtle. Some green algae also form symbiotic relationships with fungi, plants and animals.
 3. Chlorophyll a and b and carotenoids found in green algae are similar to those found in land plants.
 4. Their main energy reserves are stored as starch.
 5. Most green algae possess cell walls with cellulose
 6. RNA sequencing of green algae is similar to plants.
 7. It is believed that land plants arose from green algae.
11. **Foraminiferans and Actinopods: -**

See Lahore Board Answer No: 2

12. Polyphyletic Group of Organisms: -

Polyphyletic group of organisms means the organisms which do not share a single common ancestor.

Example: - Protists

13. Thallus: -

See Rawalpindi Board Answer No: 3

14. Chaonoflagellates: -

1. They are free living marine and fresh water zooflagellates.
2. They are colonial and sessile. Each colony is permanently attached by a thin stalk to bacteria rich debris.
3. Each cell is 5 to 10 μm long with a collar and a single flagellum.
4. They have evolutionary significance as their cells resemble collar cells of sponges.

15. Function of Pellicle in Ciliates: -

Pellicle gives ciliates a definite but changeable shape.

Rawalpindi Board Questions

1. Euglenoids are closely related to Zooflagellates. Justify the statement. (A-2010)
2. Give two examples of Green Algae. (A-2010)
3. Define Thallus. (A-2011)
4. Justify that Euglenoids are close to Zooflagellates. (A-2012)
5. Name Parasitic Amoeba. What disease does it cause? (A-2012)
6. Write down two benefits of algae. (A-2013)
7. Write down two characteristics of dinoflagellates. (A-2013)
8. Write down two differences between Fungus like Protists and Fungi. (A-2013)

Answers

1. Euglenoids are closely related to Zooflagellates: -

1. They are closely related to zooflagellates due to similar molecular data.
2. About one third of them are photosynthetic and remaining are heterotrophs. Even some of the chloroplast containing forms are facultative heterotrophs and when kept in darkness, they lose chloroplasts and start ingesting organic matter.
3. They all have an anterior depression gullet from which the flagella emerge.
4. Some heterotrophic species absorb organic compounds from the surrounding water, whereas others ingest bacteria and protists by phagocytosis through gullet, digesting their prey within food vacuoles.

2. Two Examples of Green Algae: -

1. *Spirogyra*
2. *Volvox*

3. Thallus: -

Thallus is the simple body of an alga, fungus, or non-vascular plant that lacks root, stems, or leaves.

Examples: Liverwort thallus, Lichen thallus Or
 A body which is not differentiated into true roots, stems and leaves and lacks xylem and phloem is called thallus.

4. **Euglenoids Close to Zooflagellates: -**
 See Rawalpindi Board Answer No: 1
5. **A) Name of Parasitic Amoeba: -**
Entamoeba histolytica
B) Disease caused by Parasitic Amoeba: -
 Amebiasis, a form of which amebic dysentery in humans.
6. **Two Benefits of Algae: -**
 See Lahore Board Answer No: 18 (A)
7. **Two Characteristics of Dinoflagellates: -**
 1. Most Dinoflagellates are unicellular.
 2. Their cells are often covered with shells of interlocking cellulose plates impregnated with silicates.
8. **Two Differences between Fungus like Protists and Fungi: -**
 See Lahore Board Answer No: 16 (B)

Sargodha Board Questions

1. What types of pigments are found in Chlorophyta and Rhodophyta? (A-2011)
2. Write down importance of Chlorella. (A-2012)
3. Give scientific name of plasmodial slime mold. Give its importance. (A-2012)
4. Why green algae are considered as an ancestor of plants. (A-2013)
5. Write two characters of apicomplexans. (A-2013)
6. Write two characters of zooflagellates. (A-2013)
7. Differentiate between micronucleus and macronucleus in ciliates. (A-2013)

Answers

1. **A) Pigments found in Chlorophyta: -**
 Chlorophyll a and b and carotenoids
B) Pigments found in Rhodophyta: -
 Chlorophyll a and d, carotenoids, phycoerythrin (a red pigment) and phycocyanin (a blue pigment).
2. **Importance of Chlorella: -**
 See Multan Board Answer No: 13 (A)
3. **A) Scientific Name of Plasmodial Slime Mold: -**
Physorhynchus polycephalum
B) Importance of Plasmodial Slime Mold. -
 It is a model organism that has been used to study many fundamental biological processes such as growth and differentiation, cytoplasmic streaming, and function of cytoskeleton.

- 4. Green Algae considered as an Ancestor of of Plants: -**
 Green algae are considered as an ancestor of plants because:
1. They have pigments chlorophyll a, chlorophyll b and carotenoids similar to plants.
 2. They have cell wall of cellulose similar to plants.
 3. They have starch as main energy reserve just like plants.
 4. RNA sequencing of green algae is similar to plants. e.
- 5. Write two characters of apicomplexans. (A-2013)**
1. They lack specific structures for locomotion and move by flexing.
 2. They develop spore, a small infective agent transmitted to next host, at some stage in their lives.
- 6. Write two characters of zooflagelates. (A-2013)**
1. They are mostly unicellular, a few are colonial.
 2. They possess from one to many long, whip-like flagella that enable them to move.
7. Differentiate between micronucleus and macronucleus in ciliates. (A-2013)

| Micronucleus | Macronucleus |
|--|--|
| 1. It is a small nucleus in ciliates. 2. There are one to many micronucli. 3. It is diploid nucleus. 4. It functions in sexual process. | 1. It is large nucleus in ciliates. 2. It is usually one. 3. It is polyploidy nucleus. 4. It controls cell metabolism and growth. |

Faislabad Board
Questions

1. Expalin what are Ciliates? (A-2007)
2. Write two characteristics of Oomycetes. (A-2007)
3. How are Foraminiferans source of Lime Stone? (A-2008)
4. Name a Parasitic Amoeba. What disease does it cause? (A-2008)
5. Give two characters of Ciliates? (A-2009)
6. What are Kelps? Give its parts. (A-2009)
7. What are Kelps? Give parts of thallus of a Kelp. (A-2010)
8. How are Foraminiferans source of Lime Stone? (A-2010)
9. What are Diatoms? Write their Ecological Importance. (A-2011)
10. What is the Commercial Importance of Marine Algae? (A-2012)
11. How do Ciliates differ from other Protozoans? (A-2012)
12. What are ciliates? Give one example. (A-2013)
13. What are trichonymhas? (A-2013)
14. How slime mold reproduces? (A-2013)
15. How ciliates differ from other protozoans? (A-2013)

Answers

- 1. Ciliates: -**
 Ciliates are free swimming or sessile, mostly solitary and some colonial protozoans which have cilia, a flexible outer covering, the pellice, two types of nuclei (one or more small diploid micronuclei and a large polyploid macronucleus) and a contractile vacuole.
 They reproduce asexually by binary fission and sexually by conjugation.

- 2. Two Characteristics of Oomycetes: -**

1. Their cell walls contain cellulose.
2. Their hyphae are aseptate (without cross walls).
3. **Foraminiferans Source of Lime Stone: -**
See Lahore Board Answer No: 3 (B)
4. **Parasitic Amoeba and its Disease: -**
See Rawalpindi Board Answer No: 4
5. **Two Characters of Ciliates: -**
See Dera Ghazi Khan Board Answer No: 10
6. **Kelps and its Parts: -**
See Bahawalpur Board Answer No: 8
7. **Kelps and its Parts: -**
See Bahawalpur Board Answer No: 8
8. **Foraminiferans Source of Lime Stone: -**
See Lahore Board Answer No: 3 (B)
9. **Diatoms and their Ecological Importance: -**
See Multan Board Answer No: 19
10. **Commercial Importance of Marine Algae: -**
Marine algae are source of many commercial products like algin, agar, carrageenan and antiseptics.
11. **Ciliates Different from other Protozoans: -**
See Multan Board Answer No: 18
12. **A) Ciliates:-**
See Faisalabad Board Answer No: 1
B) Example:-
Paramecium
13. **Trichonympha: -**
See Multan Board Answer No: 7
14. **Reproduction of Slime Mold: -**
Slime molds reproduce by spores. Spores are formed during unfavorable condition by Meiosis within stalked sporangia. When conditions become favorable again, spores germinate into biflagellated or amoeboid structures or swarm cells which unite to form diploid zygote. Zygote produces multinucleate plasmodium, each being diploid.
15. **Ciliates differ from other Protozoans: -**
See Multan Board Answer No: 18

Chapter No: 8 2 SQs

Multan Board

Questions

1. Give features of Zygomycota. (A2007)

2. Write a brief note on Mycorrhizae. (A-2007)
3. Differentiate between Plasmogamy and Karyogamy. (S-2007)
4. Explain what is a Mycelium? (Model Paper 2006-08)
5. Compare Ascus with a Basidium. (Model Paper-2006-08)
6. Give a description of Conidia in *Penicillium*. (A-2008)
7. Give the role of Mycorrhizae. (A-2008)
8. What are Conidiophores? (A-2008)
9. Name and explain briefly two forms of Mycorrhizae. (S-2008)
10. Why are Toadstool called Death Angel? (S-2008)
11. Why are Basidiomycetes called Club Fungi (A-2009)
12. What are Obligate Parasites? Give an example of Obligate Parasite from Fungi. (A-2009)
13. Define Histoplasmosis. How is it caused? (S-2009)
14. What is Parasexuality in Fungi? (S-2009)
15. Name most commonly exploited Yeast and explain the common method of asexual reproduction in Yeasts. (A-2010)
16. Name fungus which causes Smuts and what is meant by Smuts in Fungi? (A-2010)
17. What is the difference between Karyogamy and Plasmogamy? (S-2010)
18. Differentiate Rust from Smut. (S-2010)
19. Compare Lichen with Mycorrhiza. (A-2011)
20. Define Plasmogamy. (A-2011)
21. Why Zygomycota is called so? (S-2011)
22. Give two points of the Ecological Importance of Fungi. (S-2011)
23. What is Mycorrhizae? (A-2012)
24. Enlist six Plant Diseases caused due to fungi. (A-2012)
25. What is a Dikaryotic Hypha? (A-2013-New)
26. Differentiate between Ectomycorrhizae and Endomycorrhizae. (A-2013-New)
27. What are Conidia? (A-2013-Old)
28. Differentiate between Septate and Aseptate Hyphae. (A-2013-Old)

Answers

1. **Features of Zygomycota:**

1. They have coenocytic hyphae which have no septa or cross walls.
2. Sexual reproduction in zygomycetes results in zygospore from the mating of hyphae.
3. Both asexually and sexually produced spores are formed inside a sporangium and are dispersed on air currents.
4. Most zygomycetes are decomposers that live in the soil on the decaying plant or animal matter. Some zygomycetes are parasites of animals and plants, and still others are mycorrhizal fungi associated with plant roots.

Example: *Rizopus* (black bread mold) found growing on spoiling moist bread, fruit etc.

2. **Brief Note on Mycorrhizae: -**

Mycorrhizae (from Greek words meaning fungus roots) are mutualistic relationships between fungi and roots of plants. Such relationships occur in more than 90 % of all plant families. The mycorrhizal fungus decomposes organic material in the soil. It also benefits the plant by increasing its absorption surface area, enabling it to take in more water and nutrients such as phosphorous, zinc, copper etc. At the same time, the roots supply fungus with sugars, amino acids, and other organic substances. Or

The word mycorrhiza is used in two related meanings.

- a. First, mycorrhiza (Greek. mykes = fungus, rhiza = root) is a fungus which usually grows inside a plant's root hair cells—the cells through which plants absorb nutrients. The hyphae of mycorrhiza grow out of the root hair cells and greatly increase absorptive area.
- b. Second, mycorrhiza is a mutualistic or symbiotic association between fungal hyphae and roots of vascular plants.

3. **Difference between Plasmogamy and Karyogamy:: -**

| Plasmogamy | Karyogamy |
|--|---|
| 1. It is fusion of cytoplasm. | 1. It is the fusion of nuclei. |
| 2. It occurs in cells/hyphae of Basidiomycetes and Ascomycetes. | 2. It may occur in hyphae of all kinds of fungi. |
| 3. It is not followed by karyogamy due to which two haploid nuclei co-exist and divide in the same hyphae/cells called dikaryotic hyphae/cells for most of the life of fungus. | 3. Before karyogamy plasmtogamy always occurs. It results in the formation of a diploid zygote. |

4. **Mycelium: -**

Mycelium is a visible mass of tangled filaments of fungal cells. Or
A thick mass of hyphae is called a Mycelium. This mass is usually large enough to be seen with the naked eye and generally it has a tough, cottony texture.

Or
It is the vegetative body of most fungi and certain protests (water molds) that consists of a branched network of hyphae. Or
The thallus or body of most fungi is a multicellular or multinucleate structure known as mycelium which consists of a network of filaments called hyphae.

5. **Comparison of Ascus with a Basidium:.**

| Ascus | Basidium |
|--|---|
| 1. It is sac like, microscopic reproductive structure produced during sexual reproduction within which sexual spores are produced. | 1. It is club-like (Latin term for small pedestal), microscopic reproductive structure on which sexual spores are produced. |
| 2. Upto eight haploid sexual spores called ascospores are produced within an ascus. | 2. Four haploid sexual spores called basidiospores are borne externally at the end of basidium |
| 2. It is formed by members of Ascomycota class of fungi. | 2. It is formed by members |

| | |
|--|--|
| | of Basidiomycota class of fungi. |
|--|--|

6.

Description of Conidia in *Penicillium*: -

Brush-like arrangement of conidia at the tips of branched hyphae called conidiophores is the characteristic of *Penicillium*. These conidia give color to the circular mycelial colony.

When these conidia mature these are dispersed easily and readily.
7.

Role of Mycorrhizae: -

They increase the amount of soil contact and total surface area for absorption and help the plants in the direct absorption of phosphorous, zinc, copper and other minerals from the soil into the roots. Plants with mycorrhizal fungi absorb as much as 10 times more minerals than those without the fungi and show better growth.

Or

The fungi in mycorrhizal association function as extensions of the root system. The fungal hyphae dramatically increase the amount of soil contact and total surface area for absorption. When mycorrhizae are present they aid in direct transfer of phosphorous, zinc, copper, and other nutrients from the soil into roots.
8.

Conidiophores: -

These are supportive structures in ascomycetes and some deuteromycetes on which conidia form.

Or

Conidiophores are specialized hyphae that produce asexual naked spores called conidia.

The arrangement of conidia on conidiophores varies from species to species.

Or

1.

Conidiophores are specialized aerial hyphae at the tip of which develop conidia.

2.

They are found in members of ascomyceetes and deuteromycetes.

3.

These differ in appearance and this helps mycologist idnentify the particular Ascomycete.
9.

Two Forms of Mycorrhizae: -

There are two principal types of mycorrhizae, Ectomycorrhizae and Endomycorrhiaae.

a.

Ectomycorrhizae:

i.

They form a sheath or mantle of mycelium that is exterior to the root.

ii.

They grow between cell walls of epidermis and cortex of roots and do not enter into their cytoplasm.

iii.

Mycilium also extends far out into the soil.

iv.

Plants involved in this association are many temperate forest species such as eucalypts, pines, firs, oaks, birches, wiloows, and many herbs while the fungi involved are basidiomycetes and sometimes ascomycetes or zygomycetes (usually mushrooms and toadstools).

b.

Endomycorrhizae:

i. This association is characterized by a network of fine, branched hyphae within the cortical cells of the plant roots.

ii. Hyphal swellings or spores, vesicles may also be formed inside and between cortical cells and outside the root.

iii. Hyphae also extend out into the surrounding soil.

iv. At least 200,000 species or 85 % of land plants are involved and over 150 species of Zygomycota are involved in this association. Or

There are two principal types of mycorrhizae, Ectomycorrhizae and Endomycorrhizae.

In endomycorrhizae, fungal hyphae penetrate the outer cells of plant root, forming coils, swellings, and minute branches and also extend into surrounding soil.

In ectomycorrhizae, the hyphae surround but do not penetrate, the cell walls of the roots. These are mostly formed with pines, firs etc.

10. **Toadstool called Death Angel: -**

Toad stools are poisonous mushrooms which are called Death Angel because they contain poisonous alkaloids that affect the human nervous system, sometimes with fatal results.

Mortality rates of 50 per cent have been observed in people who consume these mushrooms.

11. **Basidiomycete called as Club Fungi: -**

The name basidiomycete refers to the reproductive structure on which sexual spores are produced. The structure, resembling a club, is called a basidium, the Latin term for small pedestal. Its spores are known as basidiospores. Or

Basidiomycetes are named for their characteristic sexual reproductive structures, the club-shaped basidium. Or

The name Basidiomycete refers to the basidium, a club shaped structure in which spores called basidiospores develop.

12. **A) Obligate Parasites: -**

Obligate Parasites are the parasites which can grow only on their living host and can not be grown on available defined growth culture medium.

B) An Example of Obligate Parasite from Fungi: -

Various Mildew species

13. **A) Histoplasmosis: -**

Histoplasmosis is lung disease prevalent in the Ohio River valley and the Mississippi River valley. The disease is often called summer flu. Fortunately, the infection is usually confined to the lungs and is of short duration and is recovered without treatment.

If the infection spreads through the blood to the heart, brain, or other parts of the body, it can be serious and sometimes fatal.

B) Cause of Histoplasmosis: -

The causative agent of histoplasmosis is *Histoplasma capsulatum*, an ascomycete.

Infection usually occurs from the inhalation of spores in dry and dusty soil contaminated with bird’s feces.

14. Parasexuality in Fungi: -

It is fusion and segregation of heterokaryotic haploid nuclei to produce recombinant

nuclei. It occurs in certain fungi. Or

Parasexuality is a kind of genetic recombination in which portions of chromosomes of two nuclei lying in the same hypha are exchanged. It is found in imperfect fungi.

15. A) Name of most commonly exploited Yeast: -

Saccharomyces cerevisiae

B) Common Method of Asexual Reproduction in Yeasts: -

Budding

16. A) Name of Fungus which causes Smuts: -

Ustilago tritici

B) Smuts in Fungi: -

In fungi smut means black dusty spore masses that resemble soot or smut.

Or

In fungi smut means spores of fungi are small and numerous, resembling

soot.

Or

Smut diseases give a black, sooty appearance to plants, fungi which cause smut diseases are called smut.

17. Differences between Karyogamy and Plasmogamy: -

See Multan Board Answer No: 3

18. Differences between Rust and Smut: -

| Rust | Smut |
|--|---|
| 1. Rusting infections resemble rusting metals. Or Rust diseases first give orange-red color or spots to the plants and then reveal masses of brick/rust-red spores on their hosts. | 1. Smut infections appear black and powdery due to the spores. Or Smut diseases give a black or sooty appearance to plants. |
| 2. There are about 7000 species of rust and they all are plant pathogens infecting leaves and stem. The plants which are infected by rusts are usually wheat, oats, and rye, as well as trees used for lumber such as white pines. | 2. They affect corn, black berries, and a number of grains. |
| 3. Many rusts require alternate hosts to complete their life cycles. | 3. They usually do not require alternate hosts. |

19. Comparison of Lichen with Mycorrhiza: -

| Lichen | Mycorrhiza |
|--------|------------|
|--------|------------|

| | |
|---|--|
| <p>1. Lichen is a dual organism composed of a fungal mycelium within which are embedded photosynthetic unicellular algae or cyanobacteria.</p> <p>2. The photosynthetic partner of a lichen is either a green alga, a cyanobacterium, or both. The fungus is most often an ascomycete, or deuteromycete, although in some tropical lichens, the fungal partner is a basidiomycete (about 20 out of 15,000 species).</p> <p>3. Fungus protects the algal partner from strong light and desiccation and itself gets food through courtesy of alga.</p> <p>4. Lichen can grow at such places where neither of the partner alone can.</p> <p>5. It is found above the soil.</p> | <p>1. Mycorrhiza is mutualistic association between soil fungi and roots of most vascular land plants.</p> <p>2. The photosynthetic partner of a mycorrhiza is any kind of a vascular land plant. The fungus is most often zygomycete or basidiomycete, although in some it is an ascomycete.</p> <p>3. Both partners get benefit from each other. The presence of the fungus, gives a plant a greater absorptive surface for the intake of minerals. The fungus also benefits from the association by receiving carbohydrates from the plant.</p> <p>4. Plants with mycorrhizal fungi show better growth.</p> <p>5. It is found below the soil.</p> |
|---|--|

- 20. Plasmogamy: -**
- It is the fusion of cytoplasm.
 - It occurs when two monokayotic hyphae of ascomycetes and basidiomycetes fuse, but their nuclei remain separate due to which dikaryotic hyphae are produced for most of the life of fungus.

- 21. Zygomycota Called So: -**
- Zygomycota is called so because they form temporary, dormant, thick walled resistsnt structures called zygospores in their sexual phase of life cycle. Or Zygomycota is named after a characteristic feature of the sexual phase of the life cycle, a temporary, dormant, thick walled structures called zygospore.

- 22. Two points of the Ecological Importance of FungiL -**
- Fungi, along with saprobic bacteria, play vital role in the recycling of inorganic nutrients in the ecosystem.
 - Mycorrhizal fungi improve the growth of plants with which they are associated.

- 23. Mycorrhizae: -**
- See Multan Board Answer No: 2

24. Six Plant Diseases Caused due to Fungi: -

- 1. Ergot of Rye
- 2. Red Rot of Sugar Cane
- 3. Apple Scab
- 4. Powdery Mildews (on grapes, rose, wheat etc.)
- 5. Cotton Root Rot
- 6. Potato Wilt

25. Dikaryotic Hypha: -

- 1. Hypha that contains two genetically distinct, sexually compatible nuclei within each cell is called Diakaryotic Hypha.
- 2. This condition is described as $n+n$ rather than $2n$ because there are two separate haploid nuclei. Or
- 1. A hypha with two nuclei is called dikaryotic hypha.
- 2. If a dikaryotic hypha has nuclei that are derived from two genetically distinct individuals, the hypha is called heterokaryotic hypha.
- 3. Hypha whose nuclei are genetically similar to each other is called homokaryotic.

26. Difference between Ectomycorrhizae and Endomycorrhizae:

| Ectomycorrhizae | Endomycorrhizae |
|---|--|
| 1. They grow between cell walls of epidermis and cortex of roots and do not enter into their cytoplasm. | 1. They grow within the cortical cells of the plant roots. |
| 2. Ectomycorrhizal plants are temperate forest trees. | 2. Endomycorrhizal plants are about 85 % land vascular plants. |
| 3. Ectomycorrhizal fungi are mostly basidiomycetes but some are ascomycetes. | 3. Endomycorrhizal fungi are over 150 species of Zygomycota. |

27. Conidia: -

- 1. Conidia are asexually produced spores formed without a protective covering at the tip of the fruiting body.
- 2. Conidia are formed when the ends of modified hyphae, called conidiophores are cut off by septa.
- 3. Many conidia are multinucleate.
- 4. Septa that cut off conidia are initially perforated, but later become blocked.
- 5. Conidia allow for rapid colonization of a new food source.

28. Differences between Septate and Aseptate Hyphae: -

| Septate Hyphae | Aseptate Hyphae |
|--|--|
| 1. Hyphae with septa or cross walls are known as Septate Hyphae. | 1. Hyphae without septa or cross walls are called Aseptate Hyphae. |
| 2. Cross-wall or septa in the septate hyphae divide the hyphae | 2. Aseptate hyphae which lack septa are not divided into individual cells. |

| | |
|--|---|
| <p>into individual cells containing one or more nuclei.</p> <p>3. These hyphae also have pores in septa which allow a mixing of adjacent cytoplasms to some extent.</p> <p>4. Fungi which have septate hyphae are called septate fungi such as ascomycetes and basidiomycetes and some deuteromycetes.</p> <p>Example: Ustilago, Penecillium etc.</p> | <p>Instead these are in the form of an elongated multinucleate large cell.</p> <p>3. Cytoplasm and organelles of neighbouring cells mingle freely in these hyphae, hence they are also known as coenocytic hyphae.</p> <p>4. Fungi which have aseptate hyphae are called aseptate fungi such as zygomycetes.</p> <p>Example: <i>Rhizopus</i></p> |
|--|---|

Bahawalpur Board Questions

1. What are Saprotrophs? (A-2007)
2. Differentiate between Ectomycorrhizae and Endomycorrhizae. (A-2007)
3. Describe difference between Mycelium and Hyphae.(A-2008)
4. Name and explain one mutualistic symbiotic association. (A-2009)
5. What do you know about Rust and Smut? (A-2009)
6. Differentiate between Ectomycorrhizae and Endomycorrhizae. (A-2010)
7. What is Histoplasmosis? How it is caused? (A-2010)
8. What are Bracket / Shelf Fungi? Give their importance. (A-2011)
9. Give the cause and symptoms of ERGOTISM. (A-2011)
10. What is Aspergillosis? (A-2012)
11. What are Mycorrhizae? (A-2012)
12. Name methods of Asexual Reproduction in Fungi. (A-2013)
13. Differentiate between Sepatate and Non-Septate Hyphae. (2013)

Answers

- 1. Saprotrophs: -**

1. Saprotrophs are organisms that feed on dead organic matter. Or
Organisms that obtain energy by the decomposition of dead organic material are called Saprotrophs. Or
These are heterotrophic organisms that digest their food externally.

Or

Saprotrophs obtain their food by secreting digestive enzymes into their surroundings and then absorbing back into saprotrophs the organic molecules produced by this external digestion. Or
These are heterotrophs that break down dead organic material and use decomposition products as a source of energy.
- 2. Differences between Ectomycorrhizae and Endomycorrhizae: -**

See Multant Board Answer No: 26

3. Differences between Mycelium and Hyphae: -

| Mycelium | Hyphae |
|---|--|
| 1. Mycelium is a vegetative body of most fungi and certain protists (water mold). | 1. Hyphae are morphological units of most fungi and water molds (protest). |
| 2. It consists of branched network of hyphae either in the form of mass of entangled hyphae or in the form of tightly compacted hyphae. | 2. Hyphae are thread like, branched filaments of eukaryotic cells (either multicellular or multinucleate) with chitin cell walls in case of fungi and cellulose cell walls in case of water molds. |
| 3. Mycilium is usually large enough to be seen with nacked eye. | Hyphae compose a mycelium. 3. Hyphae are seen only with the aid of a microscope. |

4. A) Name of One Mutualistic Symbiotic Association: -
Lichen

B) Explanation of One Mutualistic Symbiotic Association: -

1. Lichen is a dual organism composed of a fungal mycelium within which are embedded photosynthetic unicellular algae or cyanobacteria.

2. The photosynthetic partner of a lichen is either a green laga, a cyanobacterium, or both.

3. The fungus is most often an ascomycete, or deuteromycete, although in some tropical lichens, the fungal partner is a basidiomycete (about 20 out of 15,000 species).

4. Most of the visible part of lichen consists of fungus and algal components are present within the hyphae.

5. Fungus protects the algal partner from strong light and desiccation and itself gets food through courtesy of alga.

6. Lichen can grow at such places where neither of the partner alone can. In fact lichen are often the first organsisms to inhabit rocky areas.

7. Lichen reproduce mainly by asexual means usually by fragmentation, a process in which special dispersal units of the lichen, called soredia, break off and if they land on a suitable surface, establish themselves as new lichens.

5. A) Rust: -

1. Rusting infections resemble rusting metals. Or
Rust diseases first give orange-red color or spots to the plants and then reveal masses of brick/rust-red spores on their hosts.

2. There are about 7000 species of rust and they all are plant pathogens infecting

wheat, oats, leaves and stem. The plants which are infected by rusts are usually and rye, as well as trees used for lumber such as white pines.

3. Hyphae grow between host cells but push membrane-bound historia into cells which absorb nutrients causing the leaves to eventually wither and drop off.

The fungus forms spores producing red-orange spots.

4. Many rusts require alternate hosts to complete their life cycles.

Example: *Puccinia* species

B) Smut: -

1. Smut infections appear black and powdery due to the spores. Or Smut diseases give a black or sooty appearance to plants.
2. They affect corn, black berries, and a number of grains.
3. Some smuts enter seeds and exist inside the plant, becoming visible

only near maturity. Other smuts externally infects plants. In corn smut, the mycelium grows between corn kernels and secretes substances that cause the development of tumors on the ears of corn.

Example: *Ustilago* species

6. Differences between Ectomycorrhizae and Endomycorrhizae: -
See Multant Board Answer No: 26

7. Histoplasmosis and its Cause:
See Multant Board Answer No: 13

8. A) Bracket / Shelf Fungi:

Bracket / Shelf Fungi are important decomposers of wood and usually parasitize trees.

B) Importance of Bracket / Shelf Fungi: -

They cause lot of damage to stored cut lumber as well as stands of timber of living trees.

9. A) Cause of ERGOTISM: -

An ascomycete, *Claviceps purpurea* produces a powerful mycotoxin. This fungus grows as hyphae on kernels of rye, wheat, and barley where they transform dense hard tissue of the plant into a purple body called a sclerotum. Alkaloids are produced by sclerotum which are deposited in the grain as a substance called ergot. Products such as bread made from rye grain contaminated with ergot may cause ergot rye disease or ERGOTISM. Or

Claviceps purpurea, an ascomycete, infects the flowers of rye plants and other cereals.

The fungus replaces the seed with its own sclerotia or resting bodies known as ergots which contain alkaloids including lysergic acid. When live stock eat this grain or when humans eat bread made from ergot contaminated rye flour, they may be poisoned by extremely toxic substances in the ergot. The disease is called ergot rye disease or ERGOTIASM.

B) Symptoms of ERGOTISM: -

Symptoms may include numbness, hot and cold sensations, convulsions with epileptic type seizures, and paralysis of nerve endings. Or Symptoms include nervous spasm, convulsion, Psychotic delusion and even gangrene.

10. Aspergillosis: -

1. The causative agent of aspergillosis is *Aspergillus fumigatus*, an ascomycete.
2. Aspergillosis is a unique disease because fungus enters the body as conidia, then grows as mycelium.
3. *Aspergillus fumigatus* is usually harmless, but causes aspergillosis in people with defective immune systems, such as patients with AIDS.
4. During the course of disease, fungus can invade the lungs, heart, brain, kidneys and other vital organs and can cause death.
5. Infection in lungs may yield a round ball of mycelium called an aspergilloma, requiring surgery for removal.
6. Conidia in the earwax leads to a painful ear disease known as otomycosis.
7. Infection in circulatory system causes blockage of blood vessels, inflammation of inner lining of heart, or clots in the heart vessels.

11. Mycorrhizae: -

See Multan Board Answer No: 2

12. Names of Methods of Asexual Reproduction in Fungi: -

1. Spores
2. Conidia
3. Fragmentation
4. Budding

13. Differences between Septate and Non-Septate Hyphae: -

See Multan Board Answer No: 28

Dera Ghazi Khan Board

Questions

1. Define Parasexuality. (A-2008)
2. State the difference between two types of Mycorrhizae. (A-2008)
3. What are animal like characteristics of Fungi? (A-2009)
4. Differentiate between Aseptate and Aseptate Hypahae. (A-2009)
5. What is Histoplasmosis? What is its cause? (A-2010)
6. What are Yeasts? (A-2010)
7. What is a Dikaryotic Hypha? (A-2011)
8. Give two points of the Medicinal Importance of Fungi.(A-2011)
9. Write down importance of Yeast. (A-2012)
10. What are Lichens? Give its importance. (A-2012)
11. Differentiate between plasmogamy and karyogamy. (A-2013)
12. Define Parasexuality. (A-2013)

Answers

1. Parasexuality: -

See Multan Board Answer No: 14

2. **Difference between Two Types of Mycorrhizae: -**
See Multan Board Answer No: 26
3. **Animal like Characteristics of Fungi: -**
 1. They are heterotrophic like animals.
 2. Their cell wall contains chitin—the chemical found in the exo-skeleton of arthropods.
4. **Differences Between Aseptate and Aseptate Hypahae: -**
See Multan Board Answer No: 28
5. **Histoplasmosis and Cause: -**
See Multan Board Answer No: 13
6. **Yeasts: -**
 1. The word yeast refers to a large variety of unicellular, microscopic, non-hyphal fungi as well as the single cell stage of any fungus.
 2. Yeasts are derived from all the three different groups of fungi, mostly Ascomycetes. Ascomycota includes more than 300 species of yeasts.
 3. They have a single nucleus.
 4. Yeasts cells are about 8 um long and 5 um in diameter.
 5. Yeasts are plentiful where there are orchards or fruits.
 4. Asexual reproduction of yeasts is mainly by budding, a process in which a small bud grows and eventually separates from the parent cell and each bud can grow into a new yeast cell.
 5. Some yeasts also produce by binary fission, in which they undergo mitosis and then divide in half.
 6. During sexual reproduction, two haploid yeasts fuse, forming a diploid zygote. The zygote undergoes meiosis, and the resulting haploid nuclei are incorporated into ascospores. These spores remain enclosed for a time within the original cell wall, which corresponds to an ascus.
 7. The ability of yeasts to ferment carbohydrates, breaking down glucose to produce ethanol and carbon dioxide, is fundamental in production of bread, beer, and wine.
 8. *Saccharomyces cerevisiae* is the most commonly exploited yeasts.
Or
Yeasts are unicellular, microscopic, non-hyphal fungi belonging to mainly ascomycetes which have a single nucleus and reproduce asexually by budding or fission and sexually by forming asci/ascospores or basidia/basidiospore. They are of great economic importance due to their ability to ferment carbohydrate (glucose) to ethanol and carbon dioxide.
Saccharomyces cerevisiae is the most commonly exploited yeasts.
7. **Dikaryotic Hypha: -**
See Multan Board Answer No: 25
8. **Two Points of the Medicinal Importance of Fungi: -**

1. Cryptococcosis is considered the most dangerous fungal disease in humans. It affects the lungs and the meninges, the covering of the brain and spinal cord, and is estimated to account for 25 per cent of all deaths from fungal disease.

2. A fungus *Aspergillus flavus* produces toxic compounds called aflatoxins (fungal toxins are also called mycotoxins). Aflatoxins deposited in foods and ingested by humans are thought to be carcinogenic, especially in the liver.

Or

1. A fungus *Claviceps purpurea* causes a disease known as ergotism. Humans acquire the infection by eating bread made from purple ergot-contaminated rye flour. The poisonous material in the ergot causes nervous spasm, convulsion, psychotic delusion and even gangrene.

2. A fungus, *Histoplasma capsulatum* causes a serious lung disease known as histoplasmosis with tuberculosis like lesions of the lungs and other visceral organs.

9. Importance of Yeast: -

1. *Saccharomyces cerevisiae* are used for bread baking.

2. *Saccharomyces ellipsoideus* are used for alcohol production.

3. The cytoplasm of *Saccharomyces* is rich in B vitamins, a factor that makes yeast tablets, valuable nutritional supplements.

5. Yeasts were first eukaryotes to be used by genetic engineers.

6. Yeasts are also being investigated for production of hormones.

7. *Saccharomyces cerevisiae* was the first eukaryote whose genome sequence was completely studied in 1996.

8. In 1983, a functional artificial chromosome was made in *Saccharomyces cerevisiae*.

9. *Candida albicans*, a yeast, causes oral and vaginal thrush (candidiasis or candidosis).

10. Yeasts are used on a large scale to produce protein for the enrichment of animal food.

10. A) Lichens:

See Bahawalpur Board Answer No: 4 (B)

B) Importance of Lichen: -

1. They take up pollutants and can not survive where the air is polluted. As pollution decreases, lichen populations tend to increase. Hence lichen are important bioindicator of air pollution. Or Reduction in lichen growth is used as sensitive indicator of air pollution, particularly from sulfur dioxide.

2. They produce and improve the soil, thus making it suitable for plants to invade the area.

3. Reindeer mosses of the arctic region, which serve as main source of food for migrating herds of caribou, are lichens, not mosses.

4. Some lichen produce colored pigments. One of them, orchil, is used to dye

woolens, another, litmus, is widely used in chemistry laboratories as an acid - base (pH) indicator.

11. Difference Between Plasmogamy and Karyogamy: -

See Multan Board Answer No: 3

12. Parasexuality: -

See Multan Board Answer No: 14

Lahore Board Questions

1. What is the importance of Mycorrhizae for plants? (A-2006)
2. What is Mycelium? (A-2007)
3. What is budding? (A-2007)
4. Differentiate between Plasmogamy and Karyogamy. (A-2008)
5. Name Asexual and Sexual Spores of Ascomycetes. (A-2008)
6. What is Parasexuality? (A-2009)
7. Distinguish Rust from Smut. (A-2009)
8. Explain Parasexuality. (A-2010)
9. How Spores are different from Conidia? (A-2010)
10. Why Non-Septate Hyphae are called Coenocytic Hyphae? (A-2011)
11. Define Parasexuality. (A-2011)
12. Compare Obligate Parasite with Facultative Parasite. (A-2012)
13. Distinguish between Coenocytic and Septate Hyphae. (A-2012)
14. Write structural characters of *Penicillium*. (A-2012)
15. What are Toad Stools? Give example. (A-2012)
16. What is histoplasmosis and what is its cause? (Group I-A-2013)
17. Write two differences between spores and conidia. (Group I-A-2013)
18. Differentiate between Lichens and Mycorrhizae: -(Group II-A-2013)
19. What do you know about the term Haustoria? (Group II-A-2013)

Answers

1. Importance of Mycorrhizae for plants: -

Multan Board Answer No: 7

2. Mycelium: -

Multan Board Answer No: 4

3. Budding: -

Budding is an asexual process of reproduction in yeasts in which a new cell forms at the periphery or border of the parent cell and then breaks free to live independently.

Or

In budding a small protuberance (bud) grows and eventually separates from the parent cell. Each bud can grow into a new parent cell. Or

Budding is an asexual process of reproduction in which cell becomes swollen at one edge,
and a new cell called a blastopore or bud develops from the parent cell and breaks free to
live independently. Yeasts multiply by budding.

4. **Difference Between Plasmogamy and Karyogamy: -**
See Multan Board Answer No: 3

5. **A) Name of Asexual Spores of Ascomycetes:**
Conidia (sing. Conidium)

B) Name of Sexual Spores of Ascomycetes: -
Ascospores

6. **Parasexuality: -**
See Multan Board Answer No: 14

7. **Difference between Rust and Smut: -**
See Multan Board Answer No: 18

8. **Parasexuality: -**
See Multan Board Answer No: 14

9. **Spores Different from Conidia: -**

| Spores | Conidia |
|--|---|
| 1. They are asexual reproductive cells produced by zygomycetes, and some deuteromycetes. | 1. Conidia are asexual reproductive cells produced by ascomycetes, some basidiomycetes and most deuteromycetes. |
| 2. They are produced in very large numbers inside the reproductive structures called sporangia, which are cut off from the hyphae by complete septa. | 2. They are not formed within an enclosing sac or sporangium and are formed usually in chains or clusters. They are formed when ends of modified hyphae are cut off by septa. |
| 3. The hyphae, which form sporangia containing spores, are called sporangiophores. | 3. The modified hyphae which produce conidia are called conidiophores. |
| 4. Spores are produced by asexual and sexual processes. | 4. Conidia are produced by only asexual process. |
| 5. They do not occur in various sizes, shapes and colors. | 5. Conidia occur in various shapes, sizes, and colors in different species. |
| 6. They are unicellular. | 6. Conidia may be multi-cellular. |

10. **Non-Septate Hyphae are called Coenocytic Hyphae: -**
Non-septate hyphae are called Coenocytic Hyphae because they are in the form of an

elongated multinucleate large cell in which cytoplasm moves effectively, distributing the material through.

11. **Parasexuality:** -
See Multan Board Answer No: 14

12. **Comparison of Obligate Parasite with Facultative Parasite:** -

| Obligate Parasite | Facultative Parasite |
|---|--|
| A parasite which is physiologically dependent on its host is called Obligate Parasite. Or Obligate Parasites grow only on their host and can not be grown on available defined growth culture medium. Examples: Various mildews and most rust species | An organism that, under favorable circumstances, may live either a parasite or free-living is called Facultative Parasite. Or Facultative Parasite can grow parasitically on either host as well as by themselves on artificial growth media. Example: <i>Rhizopus</i> |

13. **Differences Between Coenocytic and Septate Hyphae:** -

| Septate Hyphae | Coenocytic Hyphae |
|---|--|
| 1. Hyphae with septa or cross walls are known as Septate Hyphae. 2. Cross-wall or septa in the septate hyphae divide the hyphae into individual cells containing one or more nuclei. 3. These hyphae also have pores in septa which allow a mixing of adjacent cytoplasms to some extent. 4. Ascomycetes and basidiomycetes and some deuteromycetes have septate hyphae. Example: <i>Ustilago</i> , <i>Penicillium</i> | 1. Hyphae without septa or cross walls are called Coenocytic Hyphae. 2. These hyphae which lack septa are not divided into individual cells. Instead these are in the form of an elongated multinucleate large cell. 3. Cytoplasm and organelles of neighbouring cells mingle freely in these hyphae. 4. Zygomycetes have coenocytic hyphae. Some deuteromycetes also have these hyphae. Example: <i>Rhizopus</i> |

14. **Structural Characters of *Penicillium*:** -

1. Its hyphae are septate.
2. Its asexual spores are naked conidia.
3. Conidia are formed on special branched hyphae called conidiophores.
4. Brush-like arrangement of its conidia is characteristic of *Penicillium*.
5. Conidia give color to the circular mycelial colony.

- 15. A) Toad Stools: -**
 Toad Stools are poisonous mushroom that contain poisonous alkaloids that affect the human nervous system, sometimes with fatal results.
- B) Example:**
***Amanita virosa:* -**
- i. It is an extremely poisonous mushroom.
 - ii. It is commonly known as death angel or destroying angel.
 - iii. It is distinguished, as are other amanitas, by the ring of tissue around its stalk
 - iv. It is 7.5 to 20 cm (3 to 8 in) tall.
 - v. It is found in grass or near trees throughout North America.
 - vi. About 50g (2 oz) of this mushroom can kill an adult man.
- 16. Histoplasmosis its Cause: -**
 See Multan Board Answer No: 13
- 17. Two Differences between Spores and Conidia: -**
- | Spores | Conidia |
|---|--|
| 1. They are produced in very large numbers inside the reproductive structures called sporangia. | 2. They are naked spores not formed within an enclosing sac or sporangium. |
| 6. They are unicellular. | 6. Conidia may be multi-cellular. |
- 18. Differences between Lichens and Mycorrhizae: -**
 See Multan Board Answer No: 19
- 19. Haustoria: -**
 See Faislabad Board Answer No: 5

Gujranwala Board

Questions

1. Explain what is Fungus? (A-2007)
2. Differentiate between Endomycorrhizae and Ectomycorrhizae. (A-2007)
3. What is Mycorrhizae? (A-2008)
4. Gives names of four Plant Diseases caused by Fungi. (A-2008)
5. Define Nuclear Mitosis in Fungi. (A-2009)
6. What is Parasexuality? (A-2009)
7. What do you know about Nuclear Mitosis? (A-2010)
8. Define Parasexuality. In which group of Fungi this is met with? (A-2010)
9. What are Aflatoxins? (A-2011)
10. Differentiate between Plasmogamy and Karyogamy. (A-2011)
11. Define Bioremediation. What is the role of Lichens during Ecological Succession? (A-2012)
12. Name any four Antibiotics obtained from Fungi. (A-2012)
13. How sexual reproduction occurs in zygomycota? (A-2013)
14. Give ecological importance of fungi. (2 points only) (A-2013)

Answers

- 1. Fungus:**
 A fungus is a eukaryotic, usually absorptive heterotrophic, sometimes a parasitic

organism, the vegetative body of which is called mycelium that is composed of entangled or tightly compacted microscopic, thread like, multinucleate or multi-cellular, filaments with chitin cell walls called hyphae, It has a complex life cycle usually involving spore formation.

Or

A fungus has following characteristics.

1. It is a haploid eukaryote.
2. It is unicellular (sometimes), multinucleate or multi-cellular (mostly).
3. It is absorptive heterotrophic which secretes digestive enzymes onto the food source and absorbs the predigested food (as small organic molecules) through their cell walls and plasma membrane.
4. It is usually a decomposer that gets nutrients from dead organic matter hence is called a saprobe.
5. Its vegetative body is called mycelium which consists of septate or aseptate hyphae.
6. It reproduces asexually by spores and sexually by fusing hyphae.

Or

A fungus is usually a filamentous, multi-cellular or multinucleate, spore-bearing, eukaryotic, absorptive heterotroph, usually a saprobe, having cell wall made up of chitin.

2. Differences between Endomycorrhizae and Ectomycorrhizae: -
See Multan Board Answer No: 26

3. Mycorrhizae:

See Multan Board Answer No: 2

4. Names of four Plant Diseases caused by Fungi: -

1. Red Rot of Sugar Cane
2. Apple Scab
3. Cotton Root Rot
4. Potato Wilt

5. Nuclear Mitosis in Fungi: -

1. The nuclear envelope remains intact in zygomycetes and ascomycetes. In basidiomycetes it disintegrates at the late stages of mitosis.
2. The nucleus remains visible during mitosis.
3. The nucleolus also remains visible throughout most of mitosis.
4. A spindle apparatus is formed within the nucleus.
4. Chromosomes do not line up in a metaphase plate, but seem to separate asynchronously along the mitotic spindle, giving a distinctive double track appearance.
5. Dense polar bodies replace the centrioles.
6. Nuclear membrane constricts between the two clusters of daughter chromosomes.

Or

During nuclear mitosis, the nuclear envelop does not break down and reform. (In some fungi, however, nuclear envelope dismantles late). Instead mitosis takes place within the nucleus. Mitotic spindle is formed within the nucleus dragging chromosomes to opposite poles of the nucleus. Nuclear membrane constricts between the two clusters of daughter chromosomes.

- 6. Parasexuality: -**
See Multan Board Answer No: 14
- 7. Nuclear Mitosis: -**
See Gujranwala Board Answer No: 5
- 8. Parasexuality and the Group of Fungi Having Parasexuality: -**
See Multan Board Answer No: 14
- 9. Aflatoxins:**
1. Aflatoxins are potent mycotoxins (poisonous compound produced by fungi) produced by *Aspergillus flavus*, a deuteromycete..
 3. Agriculture products on which aflatoxin-producing fungi commonly grow include peanuts, grains, cereals, sweet potatoes, corn, rice, and animal feed.
 4. Other foods that may contain traces of aflatoxins include animal products such as milk, eggs, and meat (from animals that consumed feed contaminated by aflatoxin).
 5. Aflatoxins deposited in foods and ingested by humans are thought to be carcinogenic, especially in the liver.
 6. Avoiding aflatoxin in the diet is impossible, but exposure should be minimized as much as possible. Any human or animal forage product that has become moldy should be suspected of aflatoxin contamination and discarded.
- 10. Differences between Plasmogamy and Karyogamy: -**
See Multan Board Answer No: 3
- 11. A) Bioremediation: -**
1. Degrading/removing environmental poisons/pollutants by living organisms is known as Bioremediation.
 2. The fungi's amazing ability to break down almost any carbon-containing product makes fungi excellent organisms for bio-remediation.
 3. Scientists use fungi to degrade toxins in the soil and water that are environmentally contaminated.
 4. High levels of selenium in the soil are accumulated in local plants and can be toxic to grazing animals. At least three species of fungi have been used to remove excess selenium from the soil.
- B) Role of Lichens during Ecological Succession: -**
Lichens act as pioneers during ecological succession. They live in extreme conditions on bare rocks and develop fissures and depressions for other organisms such as mosses to live.
- 12. Name of any Four Antibiotics obtained from Fungi: -**
1. Penicillin
 2. Cephalosporins
 3. Griseofulvin
 4. Cyclosporine

13. Sexual Reproduction in Zygomycota: -

1. Zygote is formed directly by the fusion of hyphae.
2. Zygote forms temporary, dormant, thick walled structure called zygosporangia.
3. Meiosis takes place when zygosporangia germinate and haploid spores are produced.
4. Spores on germination produce new mycelium.

14. Ecological Importance of Fungi: -

1. They, along with bacteria, play vital role in the recycling of inorganic nutrients in the ecosystem.
2. Some fungi are also used for bioremediation.

Rawalpindi Board

Questions

1. What is Nuclear Mitosis? Where it occurs? (A-2010)
2. What is Histoplasmosis? (A-2010)
3. Differentiate between Conidia and Spore. (A-2011)
4. Define Budding and Fragmentation. (A-2011)
5. What is Mycelium? (A-2012)
6. Name Asexual and Sexual Spores of Ascomycetes. (A-2012)
7. What is Histoplasmosis? (A-2013)
8. What is meant by Plasmogamy and Karyogamy? (A-2013)

Answers

1. **A) Nuclear Mitosis: -**
See Gujranwala Board Answer No: 5
B) Occurrence of Nuclear Mitosis:
Nuclear mitosis occurs in fungi.
2. **Histoplasmosis: -**
See Multan Board Answer No: 13
3. **Difference between Conidia and Spore: -**
See Lahore Board Answer No: 9
4. **A) Budding: -**
See Lahore Board Answer No: 3
B) Fragmentation: -
Fragmentation is simple breaking of mycelium of some hyphal fungi, each broken fragment giving rise to a new mycelium.
5. **Mycelium: -**
Multan Board Answer No: 4
6. **Names of Asexual and Sexual Spores of Ascomycetes: -**
See Lahore Board Answer No: 5
7. **Histoplasmosis: -**
See Multan Board Answer No: 13
8. **A) Plasmogamy: -**
See Multan Board Answer No: 20

B) Karyogamy: -

1. It is known as fusion of nucleus.
2. It does not take place immediately after plasmogamy.

Sargodha Board
Questions

1. Explain Parasexuality. (A-2010)
2. What are Lichens? (A-2010)
3. What is Lichen? Give its importance. (A-2011)
4. Write down Importance of Yeast. (A-2011)
5. How *Penicillium* reproduce? (A-2013)
6. What is Rhodotorula? Where it grows? (A-2013)

Answers

1. **Parasexuality: -**
See Multan Board Answer No: 14
2. **Lichens: -**
See Bahawalpur Board Answer No: 4 (B)
3. **A) Lichen:**
See Bahawalpur Board Answer No: 4 (B)
B) Importance of Lichen: -
See Dera Ghazi Khan Board Answer No: 10 (B)
4. **Importance of Yeast: -**
See Dera Ghazi Khan Board Answer No: 9
5. **Reproduction of *Penicillium*: -**
It reproduces asexually by means of naked spores formed on special hyphae called conidiophores. On germination they give rise to new hyphae of *Penicillium*.
6. ***Rhodotorula* and its growth: -**
 1. *Rhodotorula* is a pink yeast.
 2. It grows on shower curtains and other moist structures.

Faislabad Board
Questions

1. Explain what is Mycorrhizae? (A-2007)
2. What is Histoplasmosis? How does this infection spread? (A-2008)
3. What is Aspergillosis? In which persons is it more common? (A-2009)
4. Differentiate between Septate and Non-Septate Hyphae. (A-2009)
5. What are Haustoria? (A-2009)
6. Distinguish between Conidia and Spores. (A-2010)
7. State the role of an Alga and a Fungus in Lichen. (A-2010)
8. Name soil dwelling Carnivorous Fungus. How does it feed on Soil Nematodes? (A-2011)
9. Name any four Antibiotics obtained from Fungi. (A-2011)
10. What are Dikaryotic Hyphae? (A-2012)
11. How Spores are different from Conidia? (A-2012)
12. How Spores are different from Conidia? (A-2013)
13. What is nuclear mitosis? (A-2013)

Answers

1. **Mycorrhizae: -**
See Multan Board Answer No: 2
2. **A) Histoplasmosis: -**
Histoplasmosis is a serious disease of lungs and other internal organs with tuberculosis like lesions of the lungs and other visceral organs, the causative agent of which is a fungus, *Histoplasma capsulatum*.
B) Spread of Histoplasmosis:
Infection usually occurs from the inhalation of spores in dry and dusty soil contaminated with bird's feces.
Infection spreads through the blood to the heart, brain, or other parts of the body.
3. **A) Aspergillosis: -**
See Bahawalpur Board Answer No: 10
B) Common in Persons:
It is more common in persons with defective immune systems, such as patients with AIDS.
4. **Difference between Septate and Non-Septate Hyphae: -**
See Multan Board Answer No: 28
5. **Haustoria: -**
Haustoria are special hyphal tips of parasitic fungi by the help of which fungi absorb nutrients directly from the living host cytoplasm. Or
Haustoria are wall less tips of hyphae of parasitic fungi which penetrate plant cell wall but do not rupture the plant cell membrane. The haustorial membrane is rich in ATPase, an enzyme that facilitates active uptake of nutrients across the plant membrane-haustorial membrane interface. This ability to feed from the living host cell without killing it is vital for obligate parasites such as mildews and rust species.
6. **Difference between Conidia and Spore: -**
See Lahore Board Answer No: 9
7. **A) Role of an Alga in Lichen:**
Alga provides food to the fungus.
B) Role of a Fungus in Lichen: -
Fungus protects the algal partner from strong light and desiccation. Or
Fungus provides water and minerals from the soil as well as protection from strong light and desiccation.
8. **A) Name of soil dwelling Carnivorous Fungus: -**
Species of *Arthrobotrys*
B) Feeding of Carnivorous Fungus on Soil Nematodes: -
These fungi form constricting ring around soil nematodes and penetrate their hyphae into the nematodes to absorb nutritional contents, primarily to fulfil their nitrogen requirements.

9. **Name of any Four Antibiotics obtained from Fungi: -**
See Gujranwala Board Answer No: 12
10. **Dikaryotic Hyphae: -**
See Multan Board Answer No: 25
11. **Difference between Conidia and Spore: -**
See Lahore Board Answer No: 9
12. **Difference between Conidia and Spore: -**
See Lahore Board Answer No: 9
13. **Nuclear Mitosis: -**
See Gujranwala Board Answer No: 5

Chapter No: 9 2 SQs
Multan Board

Questions

1. Differentiate between Archegonia and Antheridia. (A-2007)
2. Classify Tracheophytes (Only names of different groups). (A-2007)
3. Differentiate Microphyll and Megaphyll leaves. (A-2007)
4. Why are Bryophyte called Amphibious Plants? (A-2007)
5. Explain the evolution of Megaphyll. (Model Paper-2006-08)
6. Differentiate between Homosporous and Heterosporous. (S-2007)
7. Give four differences between Dicots and Monocots. (Model Paper-2006-08)
8. What are the differences between Gymnosperms and Angiosperms? (Model Paper-2006-08)
9. Enlist the features of Spermatophyte. (A-2008)
10. State some characteristics of Dicotyledonous Plants. (A-2008)
11. What is Ovule? (A-2008)
12. Give Importance of *Cassia alata*. Give two points. (A-2009)
13. Give two vegetative characters of Psilopsida. (A-2009)
14. How does Angiosperm differ from Gymnosperm? Give two points. (S-2009)
15. Give Scientific Names of Shisham and Sweet Pea. (S-2009)
16. What is meant by Phylogenetic System of Classification? (A-2010)
17. Why Sphenopsidas called Arthrophytes? (A-2010)
18. Differentiate between Microphylls and Mega phylls. (S-2010)
19. Give two Commercial Applications of family Poaceae. (S-2010)
20. Write biological names of Potato and Tobacco. (S-2010)
21. What is meant by Phylogenetic System of Classification? (A-2011)
22. Differentiate between Leaf Venation and Circinate Vernation. (A-2011)
23. Why Anthoceropsids are advanced than other Bryophytes? (A-2011)
24. Write down scientific names of four plants belonging to family Poaceae. (A-2011)
25. What is Heterogamy? (S-2011)
26. Write two differences between Monocots and Dicots. (S-2011)
27. Write down four adaptations of Bryophytes to live in land habitat. (A-2012)
28. What advance characters are found in Sporophyte of Anthoceropsida? (A-2012)
29. Enlist Botanical Names of four plants included in family Fabaceae. (A-2012)
30. Why the Bryophytes are called "Amphibious of the Plant"? (A-2013-New)
31. What is Circinate Vernation? (A-2013-New)
32. Define Rhizome. (A-2013-Old)
33. Define Overtopping. (A-2013-Old)
34. What is Plannation? (A-2013-Old)

Answers

1. Differences between Archegonia and Antheridia: -

| Archegonia | Antheridia |
|---|--|
| These are multi-cellular, female sex organs in lower plants which bear eggs. Or Archegonia are multi-cellular, egg producing structures found in gametophytes of seedless plants and gymnosperms. Or Archegonia are the female portions of the gametophytes in seedless plants and gymnosperms that produce and protect the eggs. | These are multi-cellular, male sex organs in lower plants that bear sperms. Or These are multi-cellular, sperm-producing organs in seedless plants. Or Antheridia are multi-cellular, sperm-producing structures found in the gametophytes of seedless plants. |

2. Classification of Tracheophytes (Only names of different groups): -

- | | | |
|----|--------------|--------------|
| 1. | Sub-division | Psilopsida |
| 2. | Sub-division | Lycopsida |
| 3. | Sub-division | Sphenopsida |
| 4. | Sub-division | Pteropsida |
| | Class | Filicineae |
| | Class | Gymnospermae |
| | Class | Angiospermae |

3. Difference between Microphyll and Megaphyll Leaves: -

| Microphyll Leaf | Megaphyll Leaf |
|---|--|
| The microphyll leaf is usually small and has a single vascular strand, probably evolved from small, projecting extensions of stem tissue. Only one group of living plants, the club-mosses, has microphyll leaves. Or Microphyll leaf has a single undivided vein (vascular supply). Example: <i>Lycopodium</i> and other Lycopods | Megaphyll leaf has more than one vascular strand that probably evolved from stem branches that gradually filled in with additional tissue to form many veined leaf. Or Megaphyll leaf has divided veins and veinlets with an expanded leaf blade or lamina. Examples: Ferns and seed plants |

4. The bryophytes are called Amphibious Plants: -

The bryophytes are called amphibious plants because they can not live away from water.

They need water for reproduction. Or
 They are called amphibious plnts due to the need for sperm to swim to archegonia in a film of water. Or
 They are called amphibious plants because they are common in moist places in the tropics and temperate regions and require water (e.g. a film of rain or dew water) to reproduce sexually.

5. Evolution of Megaphylls: -
 Meaphylls evolved from dichotomously branching stems of psilopsids which first became unequal branching stems (overtapping), then these branching stems arranged in one plane (plannation) that gradually filled in with tissue (webbing) to form many veined leaves. Or
 The first step in the evolution of megaphyll was the restriction of forked branches to a single plane. The branching system became flat. The next step in the evolution was filling the space between the branching and vascular tissue. The leaf so formed looked like the web foot of a duck.

6. Difference between Homosporous and Heterosporous: -

| Homosporous | Heterosporous |
|--|--|
| <p>The plants that produce only one type of spore are called homosporous. Or Homosporous refers to a plant that produces only one type of spore.</p> <p>Examples: Bryophytes, horsetails, whisk ferns, and most ferns and club mosses.</p> | <p>The plants that produce two types of spores are called heterosporous. Or The plants which produce two different types of spore, microspore (smaller spore) and megaspore (larger spore).</p> <p>Examples: Certain ferns, club Mosses and seed plants.</p> |

7. Four Differences between Dicots and Monocots: -

| Dicots | Monocots |
|--|---|
| <p>1. They have seeds with two cotyledons (seed leaves).</p> <p>2. They have leaves with a network of veins (reticulate venation).</p> <p>3. Flower parts are mostly in fours or fives or multiple of four or five.</p> <p>4. Their stems have vascular bundles in ring.</p> <p>5. They include oaks, roses, mustards, cacti, blueberries, and sunflowers.</p> | <p>1. They have seeds with one cotyledon.</p> <p>2. They have leaves with parallel veins (parallel venation).</p> <p>3. Flower parts are mostly in threes or multiples of three.</p> <p>4. They have scattered vascular bundles in stem.</p> <p>5. They include palms, grasses, orchids, irises, onions and lilies.</p> |

8. Differences between Gymnosperms and Angiosperms: -

| Gymnosperms | Angiosperms |
|---|---|
| 1. Their reproductive structures are usually cones. | 1. Their reproductive structures are usually flowers. |
| 2. Seeds are exposed or borne on scales of cones. | 2. Seeds are enclosed within fruit. |
| 3. Conducting cells in their xylem are trachieds. | 3. Conducting cells in their xylem are vessel elements and trachieds. |
| 4. Gymnosperms include woody trees and shrubs. | 4. Angiosperms include woody or herbaceous plants. |
| 5. There are about 760 species. | 5. There are about 295,000 species. |

9. Features of Spermatophyte: -

- 1. Seed plants are heterosporous and produce two types of spores, microspores and megaspores.
- 2. Seed plants produce two kinds of gametophytes—male and female—each of which consists of just a few cells.
- 3. The whole male gametophyte rather than just the sperm as in seed plants, moves to the female gametophyte.
- 4. The female gametophyte develops within an ovule, which eventually becomes a seed.
- 5. The presence of seeds introduces into the life cycle of seed plants a dormant phase that allows the embryo to survive until environmental conditions are favourable for further growth.
- 6. The female gametophyte is attached to and nutritionally dependent on the sporophyte.
- 7. Ovules are completely or incompletely enclosed by sporophyte tissue at the time of pollination.

10. Some Characteristics of Dicotyledonous Plants: -

- 1. Seed embryo has two cotyledons (seed leaves).
- 2. Endosperm is usually absent in the mature seed, having been absorbed by two cotyledons.
- 3. Their leaves are usually broad with reticulate venation.
- 2. They are either herbivorous or woody.
- 3. Flower parts usually occur in fours or fives or multiples of four or five.
- 6. Vascular bundles in stem are arranged in circle (ring).

11. Ovule: -

It is the structure (i.e. megasporangium) in the plant ovary that develops into seed following fertilization. Or
An ovule is a seed plant structure within an ovary which contains a female gametophyte

surrounded by the nucellus and one or two integuments. At maturity an ovule becomes a seed.

Or
In seed plants, the megagametophyte is retained within the megasporangium, which is further surrounded by one or more layers of integuments. This whole structure (integuments enclosing megasporangium with developing gametophyte) is the ovule.

After fertilization and development of the embryo, the ovule matures into a seed.

- Or
1. An ovule is a megasporangium containing female gametophyte and one or two integuments, layer/s of sporophytic tissue that surround and enclose the megasporangium.
 2. One or more ovules are produced in the carpel's swollen lower portion, the ovary. Ovary wall may or may not surround their ovules. Ovules of angiosperms are protected but ovary wall does not surround the ovules of gymnosperms.
 3. After fertilization, an ovule is transformed into a seed and the integuments become the seed coats

12. Importance of *Cassia alata* (two points): -

1. Its leaves are used to cure ring worm and skin diseases.
- 2.

13. Two Vegetative Characters of Psilopsida: -

1. Psilopsida has plants with rootless sporophytes.
2. It has both a horizontal underground rhizome and vertical aerial stems.

Whenever the stem forks or branches, it always divides into two equal halves (dichotomous

- branching).
- Or
1. They resemble a whisk broom because they have no leaves.
 2. They do not have true roots but are anchored to the substrate by a creeping rhizome covered with rhizoids.

14. Differences between Angiosperm and Gymnosperm: -

| Angiosperm | Gymnosperm |
|---|---|
| 1. Its reproductive structures are usually flowers. | 1. Its reproductive structures are usually cones. |
| 2. Seeds are enclosed within fruit. | 2. Seeds are exposed or borne on scales of cones. |

15. A) Scientific Name of Shisham: -

Lathyrus odoratus

B) Scientific Name of Sweet Pea: -

Dilbergia sissoo

16. Phylogenetic System of Classification: -

A system of classification which reflects the natural relationship among living organisms and their mode of origin is called Phylogenetic System of Classification.

The system of classification, in which organisms are placed into groups on the basis of a combination of shared ancestral characters and shared derived characters, is called phylogenetic system of classification.

17. Sphenopsidas are called Arthrophytes: -

They have hollow jointed stems impergenated with silica and a whorl of leaves at each joint, hence they are called Arthrophytes. Or
Sphenopsidas are called arthrophytes because the whole plant body is composed of large number of joints. Main stem is not smooth, it has large number of ridges and furrows.
Each node has whorl of branches. (e.g. *Equisetum*)

18. Difference between Microphylls and Megaphylls: -

See Multan Board Answer No: 3

19. Two Commercial Applications of family Poaceae: -

1. Some species of grasses are used in making papers.
2. Sugar is obtained from the juice of *Saccharum officinarum* (sugar cane).
Or
1. The dried seeds and leaves of the cereal crops are used as fodder for the cattle.
2. *Cymbopogan citratus* (lemon grass) which yield lemon grass oil is used in perfumes and soap industry and for making infusion. Or
1. *Bambusa* (Bamboo) are used as building material for the thatching huts, making boats, carts, pipes etc. and the split stem are woven into mats, baskets, fans, hats, course umbrella.
1. Fibers obtained from the leaves of *Saccharum munja* which is used in making ropes.

20. Biological names of Potato and Tobacco: -

Biological names of potato and tomato are *Solanum tuberosum* and *Lycopersicum osculentum* respectively.

21. Phylogenetic System of Classification: -

See Multan Board Answer No: 16

22. Difference between Leaf Venation and Circinate Vernation: -

| Leaf Venation | Circinate Vernation |
|--|------------------------------------|
| It is the arrangement of veins in the leaf blde of leaf. | It is development pattern of leaf. |

23. Anthoceropsids are advanced than other Bryophytes: -

1. Sporophyte, except for a little stage of development, is not dependent upon gametophyte for nourishment and protection because it has stomata and chloroplasts in the epidermis and can thus photosynthesize its own food.
2. It has waxy cuticle to check excessive loss of water (desiccation).

3. There is band of meristematic tissue at the junction of foot and spore producing region which keeps on adding cells towards the spore producing region during the formation, maturation and dispersal of spores from the opposite end.

Or

1. The sporophyte has stomata and chloroplasts and can undergo photosynthesis.
 2. It has meristem which keeps on adding cells.
 Due to these characters, sporophyte can continue to survive even after the death of gametophyte.

Or

1. A unique feature of sphenopsids is that the sporophytes, unlike those of mosses and liverworts, continue to grow from their bases for the remainder of gametophyte's life.
 2. Sporophyte, except for a little stage of development, is not dependent upon gametophyte for nourishment and protection because it has stomata and chloroplasts in the epidermis and can thus photosynthesize its own food.

24. Scientific Names of Four Plants belonging to family Poaceae: -

- 1. Triticum vulgare -Wheat
- 2. Zea mays Corn
- 3. Oryza sativa Rice
- 4. Saccjarum officinarum Sugar cane

25. Heterogamy: -

It is production of two types of gametes, male gametes (sperms) and female gametes (oospheres or eggs) produced by male gametophytes and female gametophytes.

Or

It is defined as production of two different type gametes one is male (motile) and the other female (non-motile) full of stored food.

26. Two differences between Monocots and Dicots: -

| Monocots | Dicots |
|---|---|
| 1. They have fibrous root system. | 1. They have tap root system. |
| 2. Their pollen grains have one furrow or pore. | 2. Their pollen grains have three furrows or pores. |

27. Four Adaptations of Bryophytes to live in Land Habitat: -

1. Formation of rhizoids for absorption of water and anchorage.
 2. Evolution of heterogamy i.e. production of two types of gametes, motile gametes or sperms and non-motile female gametes or eggs containing stored food.
 3. Production and protection of gametes by multicellular sex organs, antheridia and archegonia.
 4. Retention and protection of multicellular embryo within the female reproductive body during its development.

Or

1. Formation of compact multicellular plant body which helped in the conservation of water by reducing cell surface area exposed to dry land conditions.
 Presence of cuticle further reduces loss of water by evaporation.

2. Development of photosynthetic tissue into special chambers for the absorption of carbon dioxide without losing much water and exposure to light.
3. Alternation of spore-producing generation (sporophyte) with gamete producing generation (gametophyte) enabled the plant to produce and test the best genetic combinations for the versatile terrestrial conditions.
4. Gametes are produced and protected by the special multicellular organs (antheridia and archegonia).

28. Advance Characters are found in Sporophyte of Anthocerotopsida: -
See Multan Board Answer No: 23

29. Botanical Names of four plants included in family Fabaceae: -

1. *Lathyrus odoratus* Sweet pea
2. *Dalbergia sisso* Shisham
3. *Arachis hypogea* Peanut
4. *Cicer arietinum* Chick pea

30. Bryophytes are called “Amphibious of the Plant”: -
See Multan Board Answer No: 4

31. Circinate Vernation: -

In ferns, when the frond or leaf is immature and young, it is coiled and this pattern of development is called Circinate Vernation. Or

32. Rhizome: -

1. A rhizome is a horizontal underground stem that bears leaves and buds and often serves as storage organ and a means of asexual reproduction.

Or

- Underground horizontal stem is known as Rhizome.
2. Some rhizomes are dichotomously branched and bear rhizoids that perform the function of roots. (Psilopsida)
3. In ferns rhizome is a short, thick, horizontal underground unbranched stem. The rhizome is protected by brownish scales (ramenta) and covered by persistent leaf basis. Fibrous adventitious roots arise from the lowerside of the rhizome. Large, pinnately compound fronds arise from the upperside of rhizome.
4. Rhizome may be long and thin as in sod-forming grasses.
5. It is thick and fleshy as in irises.
6. It survives the winter and contribute to asexual reproduction because each node bears a bud.
7. Some rhizomes have enlarged portions called tubers, which function in food storage.

33. Overtopping: -

Unequal branching is known as Overtopping. Or
In the evolution of megaphyll leaf, dichotomously branched aerial portion of the stem of psilopsida grew in different planes with some branches remained short while other grew

at much faster space. Such an unequal development of various branches is called

Overtopping.

34. **Plannation:** -

Branching in same plane is known as Plannation. Or

Arrangement of unequal dichotomies in one plane is called Plannation.

This was a step which took place in the evolution of megaphyll leaf from the stems of

members of psilopsida.

Bahawalpur Board

Questions

1. What is the significance of Alternation Generation? (A-2007)
2. What is Overtopping? (A-2007)
3. Differentiate between Dicots and Monocots. (A-2007)
4. Give Botanical names of Wheat and Rice. (A-2008)
5. Differentiate between Calyx and Coroll. (A-2008)
6. How you can define Bryophytes with example? (A-2008)
7. What do you know about Circinate Vernation? (A-2008)
8. Describe difference between Ovule and Seed. (A-2008)
9. What are the names of two sub-divisions of Bryophytes? (A-2009)
10. Define Circinate Vernation. (A-2009)
11. Give Significance of Alternation of Generation. (A-2011)
12. Explain Circinate Vernation. (A-2011)
13. Write Vegetative Characters of family Solanaceae. (A-2011)
14. Why Bryophytes are called Amphibians of the Plant? (A-2012)
15. What are Gymnosperms? (A-2012)
16. What is Circinate Vernation? (A-2012)
17. Give two differences between Monocots and Dicots. (A-2013)
18. Write the names of two plants belonging to family solanaceae. (A-2013)

Answers

1. **Significance of Alternation of Generation:**
Alternation of generation is a very important phenomenon which provides continuous genetic variabilities and selection for the best genetic make up for survival and adaptation in the changing environments. Or
 1. Gametophytes with better genetic make up will have a better chance for survival.
 2. Genetic variability provided by sporophyte will allow the populations to become increasingly better adapted to their environment. 1.
2. **Overtopping:** -
See Multan Board Answer No: 33
3. **Differences between Dicots and Monocots:** -
See Multan Board Answer No: 7
4. **Botanical Names of Wheat and Rice:**
 1. *Triticum vulgare* Wheat
 2. *Oryza sativa* Rice

5. **Differences between Calyx and Coroll:** -

| Calyx | Corolla |
|---------------------------------|---------------------------------|
| 1. The sepals of the flower are | 1. The petals of the flower are |

| | |
|--|--|
| <p>collectively called Calyx.</p> <p>2. It is represented by K.</p> <p>2. It is outermost whorl of flower.</p> <p>3. It is usually of green color.</p> <p>4. It encloses and protects other parts of flower.</p> | <p>collectively called Corolla.</p> <p>2. It is represented by C.</p> <p>2. It is the second whorl of the flower.</p> <p>3. It is usually brightly colored (other than green).</p> <p>4. It surrounds the reproductive parts of the flower and helps in pollination by attracting insects.</p> |
|--|--|

6. **A) Bryophytes: -**
 Bryophytes are non-vascular, homosporous plants, in which haploid, gamete-producing, gametophyte generation is photosynthetic and dominant to which is attached diploid, spore-producing, heterotrophic, sporophyte generation.
 Or
 Bryophytes are defined as:
 “Vascular system absent; gametophyte dominant; sporophyte attached to gametophyte; homosporous”.
- B) Eexample: -**
Funaria, Marchentia, Porella, Polytrichum, Anthoceros etc.

7. **Circinate Vernation: -**
 See Multan Board Answer No: 31

8. **Difference between Ovule and Seed: -**

| Ovule | Seed |
|--|--|
| <p>1. It is seed plant structure within an ovary before fertilization.</p> <p>2. At maturity an ovule becomes a seed.</p> <p>3. An ovule is a megasporangium containing female gametophyte and one or two integuments, layer/s of sporophytic tissue that surround and enclose the megasporangium.</p> <p>4. It is only found in the ovary which may or may not be surrounded by ovary wall.</p> | <p>1. It is seed plant structure formed after fertilization.</p> <p>2. It develops from an ovule.</p> <p>3. It consists of an embryo and a food supply surrounded by seed coat.</p> <p>4. It is found within fruit, totally exposed or borne on scale of female cone..</p> |

9. **Names of two sub-divisions of Bryophytes:**
 1. Hepaticopsida
 2. Anthoceropsida

10. **Circinate Vernation: -**
 See Multan Board Answer No: 31

11. **Significance of Alternation of Geneation:**

See Bahawalpur board Answer No: 1

12. Circinate Vernation: -

See Multan Board Answer No: 31

13. Vegetative Characters of family Solanaceae: -

1. Plants are trees, shrubs or herbs.
2. Stems are herbaceous, or woody or climber by tendrils.
3. Leaves are alternat, compound or rarely simple, sometimes partially or completely modified into tendrils.
4. Stipules are present. Stipules are mostly leafy.

14. Brophytes are called Amphibians of the Plant: -

See Multan Board Answer No: 4

15. Gymnosperms: -

1. There are four groups of living gymnosperms, conifers, cycads, egyptophytes, and Ginkgo.
2. Gemnosperms are naked seeded plants because their ovules, which become seeds, Rest exposed on a scale and is not completely enclosed by sporophyte tissues at the time of pollination. However, their seeds are sometimes enclosed other sporophyte tissues by the time they are mature.
3. They lack the flowers and fruits.
4. They show regular heteromorphic alternation of generation.
5. They have independent, dominant sporophyte but less conspicuous, dependent gametophyte.
6. The female gametophyte is permanently retained within the ovule.
7. Two kinds of spore, microspores and megaspores, develop on microsporophylls and megasporophylls respectively.
8. The megasporophylls bearing ovules are not folded and joined at the margins to form an ovary. For this reason the seeds lie naked on the megasporophyll.

16. Circinate Vernation: -

See Multan Board Answer No: 31

17. Two Differences between Monocots and Dicots: -

See Multan Board Answer No: 26

18. Names of Two Plants belonging to family Solanaceae: -

1. *Solanum tuberosum* (Potato)
2. *Capsicum frutescens* (Red pepper)

Dera Ghazi Khan Board

Questions

1. What is Protonema? How does it develop? (A-2008)
2. State the structure of Female Gametophyte of an Angiosperm. (A-2008)
3. What is Double Fertilization? (A-2008)
4. Define Double Fertilization. In which group of plants it occur? (A-2009)
5. Write the biological names of Wheat and Rose. (A-2009)
6. Name any two living genera of Psilophyta. (A-2010)
7. What is Double Fertilization? In which group of plants is it present? (A-2010)
8. Compare Homosporous Plants with Heterosporous Plants. (A-2010)

9. Why Bryophytes are said to be Amphibious Plants? (A-2011)
10. What is an Alternation of Generation? (A-2011)
11. Differentiate between Over Topping and Plannation. (A-2011)
12. Give three differences between Monocot and Dicot Plants. (A-2012)
13. Why are Anthocerosida advanced than other Bryophytes? (A-2012)
14. Define Phylogenetic System of Classification. (A-2012)
15. What are amphibians of the plant world? (A-2013)
16. Differentiate between Homospory and Heterospory. (A-2013)

Answers

1. **Protonema and its Development:**

In mosses, protonema is a filament of haploid cells that grows from a spore and develops into leafy moss gametophytes. Or
Protonema is a filament of haploid cells that resembles a filamentous green alga which is formed from a spore and develops buds, each of which grows into a green gametophyte.

2. **Structure of Female Gametophyte of an Angiosperm: -**

Female gametophyte of an angiosperm consists of eight haploid nuclei embedded in a mass of cytoplasm. The cytoplasm differentiates into two cells, one of which is an egg and another of which contains two polar nuclei. Or

The female gametophyte of an angiosperm contains seven cells with eight haploid nuclei.

Six of these cells, including the egg cell or oosphere, contain a single nucleus each, and a

central cell has two nuclei, called polar nuclei. Or

The female gametophyte of an angiosperm has seven cells only. One of these cells is the

egg or oosphere. Or

The female gametophyte of an angiosperm (also called embryo sac) consists of these seven

cells:
One egg cell, associated with
Two synergid cells;
One central cell, with two polar nuclei;
Three antipodal cells

Or

The female gametophyte or embryo sac of an angiosperm is a seven cell structure with

eight nuclei. Within the female gametophyte, the eight nuclei are arranged in precise positions.

- i. One nucleus is located near the opening of female gametophyte in the egg cell.
- ii. Two nuclei are located in a single cell in the middle and are called polar nuclei.
- iii. Two nuclei are contained in cells called synergids that flank the egg cell.
- iv. Three nuclei reside in cells called antipodal cells located at the opposite end of the egg.

3. **Double Fertilization: -**

The process in which one sperm fuses with the egg, forming a zygote, and the other sperm

fuses with the polar nuclei, forming the primary endosperm nucleus in angiosperm is called Double Fertilization. Or
 In double fertilization, characteristic of angiosperm plants, one sperm nucleus unites with the egg nucleus forming a $2n$ zygote, and the other sperm nucleus migrates and unites with the polar nuclei of the central cell, forming a $3n$ endosperm nucleus. Or
 It is a process in the flowering plant life cycle in which there are two fertilizations, one fertilization results in formation of a zygote, whereas the second results in formation of endosperm. Or
 In double fertilization, one sperm cell fuses with the egg forming a zygote that grows by mitosis and develops into a multicellular embryo in the seed, whereas the second sperm cell fuses with the two haploid polar nuclei of the central cell to form a $3n$ cell that grows by mitosis and develops into endosperm. It occurs in angiosperms (flowering plants).

4. Double Fertilization: -

See Dera Ghazi Khan Board Answer No: 3

5. Biological Names of Wheat and Rose: -

1. *Triticum vulgare* Wheat
2. *Rosa indica* Rose

6. Names of any Two Living Genera of Psilophyta: -

1. *Psilotum*
2. *Tmesipteris*

7. Double Fertilization: -

See Dera Ghazi Khan Board Answer No: 3

8. Comparison of Homosporous Plants with Heterosporous Plants: -

See Multan Board Answer No: 5

9. Bryophytes are called Amphibians of the Plant: -

See Multan Board Answer No: 4

10. Alternation of Generation: -

Alternation of generation is the term used to describe that aspect of life in which there are two distinct forms of the organism. Each form is involved in the production of other and only one is involved in producing gametes.
 Example : Plants have a unique life cycle. There is a haploid gametophyte stage that produces haploid sex cells by mitosis. There is also a diploid sporophyte stage that produces haploid spores by meiosis. This alternation of generation is a unifying theme that is present in all members of this kingdom. Or
 It is a reproductive cycle in which a haploid (n) phase, the gametophyte, gives rise to gametes which after fusion form a zygote, germinate to produce a diploid ($2n$) phase,

sporophyte. Spores produced by meiotic division from the sporophyte give rise new gametophyte completing the cycle. Or
 It is process in which mulicellular haploid gametophytic (gamete producing) generation alternates with the multicellular diploid sporophytic (spore producing) generation.

11. Differences between OverTopping and Plannation: -

| Over Topping | Plannation |
|--|---|
| Unequal branching is known as Overtopping. | Branching in same plane is known as Plannation. |

12. Three Differences between Monocot and Dicot Plants:

| Monocot Plants | Dicot Plants |
|--|--|
| 1. They have seeds with one cotyledon. | 1. They have seeds with two cotyledons. |
| 2. They have leaves with parallel veins (parallel venation). | 2. They have leaves with a network of veins (reticulate venation). |
| 3. Flower parts are mostly in threes or multiple of three. | 3. Flower parts are mostly in fours or fives or multiples of four or five. |

13. Anthoceropsida are advanced than other Bryophytes: -

See Multan Board Answer No: 23

14. Phylogenetic System of Classification: -

See Multan Board Answer No: 16

15. Amphibians of the Plant World: -

Bryophytes are amphibians of the plant world which live on land but require water for their reproduction, hence are found in moist places.

16. Differences between Homospory and Heterospory: -

| Homospory | Heterospory |
|--|--|
| 1. Production of one type of haploid spores is called Homospory. | 1. Production of two types of Haploid spores, microspores (male) and megaspores (female) is called Heterospory. |
| 2. In homospory, spores give rise to gametophyte plants that produce both egg cells and sperm cells. | 2. The evolution of heterospory was an essential step in the evolution of seeds. Microspores give rise to male gametophytes that produce sperm cells. Megaspores give rise to female gametophytes that produce eggs. |
| 3. It is characteristic of bryophytes, horsetails, whisk ferns, and | |

| | |
|-----------------------------|--|
| most ferns and club mosses. | 3. It occurs in certain club mosses, certain ferns, and all seed plants. |
|-----------------------------|--|

Lahore Board Questions

1. Write botanical names of these plants: a) Rice b) Tomato (A-2006)
2. Give two characters of Bryophyta. (A-2007)
3. Define Alternation of Generation. (A-2007)
4. Differentiate between Homospory and Heterospory. (A-2007)
5. What is the Significance of Alternation of Generation in Plants? (A-2008)
6. Differentiate between Microphylls and Megaphylls. (A-2008)
7. Write the biological name of Shisham and Sweet Pea. (A-2008)
8. What are Essential and Non-Essential Parts of Flower? (A-2009)
9. What are Arthropyte Plants? Give an example. (A-2009)
10. What is Circinate Vernation? (A-2009)
11. Define Alternation of Generation. What is its Significance? (A-2010)
12. Name the living and extinct representatives of Psilopsida. (A-2010)
13. Quote four examples of Ferns. (A-2010)
14. Define Double Fertilization. Give its importance. (A-2011)
15. Give three differences between Monocot and Dicot Plants. (A-2011)
16. What is Protonema? In which group Bryophytes is it produced? (A-2011)
17. How Overtopping and Webbing occurred in the Evolution of Leaf? (A-2012)
18. Differentiate between Monocots and Dicots in arrangement of Vascular Tissues. (A-2012)
19. In what ways Sporophyte of Bryophyte are different? (A-2012)
20. What is Protonema? In which group of Bryophytes is it produced? (A-2012)
21. Differentiate Leaf Venation and Circinate Vernation. (A-2012)
22. Why are Anthocerosids considered advanced than other Bryophytes? (A-2012)
23. Define the term alternation of generation. (Group I-A-2013)
24. Give literal meanings of terms gymnosperms and angiosperms. (Group I-A-2013)
25. What advance characters are found in the sporophyte of antheropsida? (Group II-A-13)
26. Enlist botanical names of four genera of family poaceae. (Group II-A-13)

Answer

1. **Botanical Names of:** a) **Rice** b) **Tomato:** -
 - a. Rice *Triticum vulgare*
 - b. Tomato *Lycopersicum esculentum*
2. **Two Characters of Bryophyta:** -
 1. Bryophytes are homosporous.
 2. They lack vascular system.

Or

 1. They have a dominant, independent, free living, and haploid gametophyte which produces a sporophyte, a less conspicuous generation, partially or totally dependent on the gametophyte for its nutrition.
 2. Their sporophyte produces in sporangia one kind of haploid spores (i.e. it is homosporous) by meiosis.

3. **Alternation of Generation: -**
See Dera Ghazi Khan Board Answer No: 10
4. **Difference between Homospory and Heterospory: -**
See Bahawalpur Board Answer No: 16
5. **Significance of Alternation of Generation in Plants: -**
See Bahawalpur Board Answer No: 1
6. **Difference between Microphylls and Megaphylls: -**
See Multan Board Answer No: 3
7. **Biological Name of Shisham and Sweet Pea: -**
 1. **Shisham** - *Dalbergia sisso*
 2. **Sweet Pea** *Lathyrus odoratus*
8. **A) Essential Parts of Flower: -**
Stamens and carpels are the essential parts of the flower.
They are reproductive parts of the flower
B) Non-Essential Parts of Flower: -
Sepals and petals are non-essential parts of flower.
They are non-reproductive parts of the flower.
9. **Arthrophyte Plants with an Example: -**
Sphenopsidas or Hornwort are Arthrophyte Plants. They have hollow jointed stem with
whorl of leaves at each joint.
Example: *Equisetum*
10. **Circinate Vernation: -**
See Multan Board Answer No: 31
11. **A) Alternation of Generation: -**
See Dera Ghazi Khan Board Answer No: 10
B) Significance of Alternation of Generation: -
See Bahawalpur Board Answer No: 1
12. **A) Living Reprintatives of Psilopsida:**
 1. *Psilotum*
 2. *Tmesipeteris***B) Extinct Reprintatives of Psilopsida:**
 1. *Cooksonia*
 2. *Psilophyton*
 3. *Horneophyton*
13. **Four Examples of Ferns: -**
 1. *Dryopteris*
 2. *Pteridium*
 3. *Adiantum*
 4. *Pteris*
14. **A) Double Fertilization: -**
See Dera Ghazi Khan Board Answer No: 3
B) Importance of Double Fertilization: -
It ensures the production of diploid zygote and triploid endosperm. Zygote changes into embryo, while endosperm provides food for the development of embryo and sometimes for the germination of seed.

- 15. Three differences between Monocot and Dicot Plants: -**
See Dera Ghazi Khan Board Answer No: 12
- 16. A) Protonema: -**
Protonema is a filament of haploid cells that resembles a filamentous green alga which is formed from a spore and develops buds, each of which grows into a green gametophyte.
- B) Group of Bryophytes in which protonema produced: -**
The group of Bryophytes in which protonema is produced is Bryopsida commonly known as Mosses.
- 17. A) Overtopping in the Evolution of Leaf: -**
Overtopping was the first step in the evolution of leaf in which dichotomously branched aerial portion of stem of Psilopsida grew unequally (some branches remained short and others grew very large), all in different planes.
- B) Webbing in the Evolution of Leaf:**
Webbing was the final step of evolution of leaf in which spaces between close branches in the same plane gradually became filled in with chlorophyll-containing cells changing the branches into a single megaphyll leaf with many veins.
- 18. Differentiate between Monocots and Dicots in arrangement of Vascular Tissues: -**

| Feature | Monocots | Dicots |
|---------------------------------|---|---|
| Arrangement of Vascular Tissues | Vascular tissues in stem are usually scattered or more complex arrangement. | Vascular tissues in stem are arranged in a circle (ring). |

- 19. Sporophyte of Bryophyte are Different: -**
1. They are less conspicuous.
2. They are partially or completely dependent upon the gametophyte for their nutrition.
- 20. Protonema and its Group: -**
See Lahore Board Answer No: 16
- 21. Difference between Leaf Venation and Circinate Vernation: -**
See Multan Board Answer No: 12
- 22. Anthoceropsides are considered Advanced than other Bryophytes: -**
See Multan Board Answer No: 23
- 23. Aternation of Gneration: -**
See Dera Ghazi Khan Board Answer No: 10
- 24. Literal Meanings of Terms Gmnosperms and Agiosperms: -**
1. The term gymnosperm literally means “aked seeded”
2. The term angiosperm literally means “enclosed seeded”.
- 25. Advance Characters found in the Sporophyte of Antheropsida: -**
See Multan Board Answer No: 23

26. Botanical Names of Four Genera of family Poaceae: -

1. Triticum vulgare (Wheat)
2. Zea mays (Corn)
3. Oryza sativa (Rice)
4. Saccharam officinarum (Sugar cane)

Gujranwala Board

Questions

1. What are the details of Double Fertilization? Discuss its significance. (A-2006)
2. Write four characters of Bryophytes. (A-2007)
3. What is the significance of Alternation of Generation? (A-2007)
4. Differentiate between Dicots and Monocots. (A-2007)
5. Write down the names of four sub-divisions of Tracheophyta. (A-2008)
6. What is Alternation of Generation? (A-2008)
7. What is Ovule? (A-2008)
8. Define Phylogenetic System of Classification. (A-2009)
9. What is Arthropyte (Horsetail)? (A-2009)
10. Define Circinate Vernation. (A-2009)
11. What is Heterospory? Give an example of a Heterosporous Plant. (A-2010)
12. Name four sub-divisions of Tracheophyta. (A-2010)
13. Define Double Fertilization. (A-2010)
14. Write briefly Double Fertilization. (A-2011)
15. What types of Corolla are found in the flowers of plants belonging to family Fabaceae? (A-2011)
16. Define Pollen Grain. (A-2011)
17. Give four examples of Ferns. (A-2012)
18. Distinguish between Monocots and Dicots. (A-2012)
19. Write down the scientific name and name of family: i) Tomato ii) Sheesham (A-2012)
20. What is annulus and stomium? (A-2013)
21. Name the classes of division bryophyta. (A-2013)

Answers

1. A) Details of Double Fertilization: -

After pollination, pollen grain germinates on the stigma of carpel and forms pollen tube with two sperms. As pollen tube enters the embryo sac it discharges two sperms both participate in fertilization. One sperm cell fuses with the egg forming a zygote that grows by mitosis and develops into a multicellular embryo in the seed. The second sperm cell fuses with the two haploid polar nuclei of the central cell to form a triploid (3n) cell that grows by mitosis and develops into endosperm, a nutrient tissue rich in lipids, proteins, and carbohydrates that nourishes the growing embryo. This fertilization process which includes two separate fusions, is called double fertilization and is, with two exceptions, unique to flowering plants.

B) Significance of Double Fertilization: -

See Lahore Board Answer No: 14 (B)

2. Four Characters of Bryophytes:

1. They lack xylem and phloem (vascular bundle), hence are known as non-vascular plants.
 2. Most bryophytes are small, few exceed seven centimeters in height. The gametophytes are more conspicuous than sporophytes. Sporophytes are attached to the gametophytes and depend on them nutritionally to varying degree.
 3. They require water to reproduce sexually, hence are common in moist places.
 4. Their sporophytes produce only one type of spore, hence they are known as homosporous. Or
1. Bryophytes are non-vascular plants and lack xylem and phloem.
 2. Bryophytes are the only plants with a dominant gametophyte generation.
- Their sporophytes remain permanently attached and nutritionally dependent on the gametophyte.
3. Their sporophyte produces in sporangia one kind of haploid spores (i.e. it is homosporous) by meiosis.
 4. They require water for fertilization. The sperm cells must swim from the antheridia to the archegonia.
- 3. Significance of Alternation of Generation: -**
See Bahawalpur Board Answer No: 1
- 4. Difference between Dicots and Monocots: -**
See Multan Board Answer No: 7
- 5. Names of Four Sub-divisions of Tracheophyta: -**
1. Sub-division Psilopsida
 2. Sub-division Lycopsida
 3. Sub-division Sphenopsida
 4. Sub-division Pteropsida
- 6. Alternation of Generation: -**
See Dera Ghazi Khan Board Answer No: 10
- 7. Ovule: -**
See Multan Board Answer No: 11
- 8. Phylogenetic System of Classification: -**
See Multan Board Answer No: 16.
- 9. Arthrophyte (Horsetail): -**
1. Horsetails (Sphenopsida) consist of one genus, *Equisetum*, and approximately 25 species of distinct seedless vascular plants.
 2. Horstail sporophytes consist of ribbed, jointed, photosynthetic stems that arise from branching underground rhizomes with roots at their nodes. A whorl of non-photosynthetic, scale like leaves emerge at each node.
 3. They are called arthrophytes because the whole plant body is composed of large number of joints
 4. Horsetails are so named because certain non-vegetative (non-reproductive) stems have whorls of branches that give the appearance of a bushy horse's tail.

5. Many horsetails have strobili at the tips of structures called sporangiophores.
6. The thylloid, independent gametophytes grow upon clayey soil and mud.
- 10. Circinate Vernation: -**
See Multan Board Answer No: 31
- 11. A) Heterospory: -**
Production of two types of haploid spores, microspores (male) and megaspores (female) is called Heterospory.
- B) An Example of a Heterosporous Plant: -**
Selagenella
- 12. Names of Four Sub-divisions of Tracheophyta: -**
See Gujranwala Board Answer No: 5
- 13. Double Fertilization: -**
See Dera Ghazi Khan Board Answer No: 3
- 14. Briefly Note on Double Fertilization: -**
See Gujranwala Board Answer No: 1 (A)
- 15. Types of Corolla are found in the flowers of plants belonging to family Fabaceae: -**
1. Corolla is papilionaceous.
 2. There are five petals which are usually clawed and dissimilar. There is large posterior petal called Standard, two lateral petals called Wings and two inner petals fused to form Keel which encloses stamens and carpels.
- 16. Pollen Grain: -**
Pollen grain is an immature male gametophyte in seed plants. Or
It is a binucleate or trinucleate plant structure produced from a microspore in a microsporangium. Or
Pollen grain is the immature male gametophyte of seed plants (gymnosperms and angiosperms) that germinates to produce mature male gametophyte which produces sperms capable of fertilization. Or
A microspore of seed plants that contains the microgametophyte or male gametophyte including the gametes is called a pollen grain. Or
1. Pollen grain is an immature male gametophyte developed from a microspore.
 2. Pollen grain is an extremely small which consists of two cells, the tube cell and the generative cell.
 3. When pollen grain is transferred to the stigma of carpel, it germinates. The tube cell forms pollen tube. The germinated pollen grain with pollen tube is called mature male gametophyte.
 4. The generative cell divides to form two nonmotile sperms that move down the pollen tube and are discharged into the embryo sac.
- 17. Four Examples of Ferns: -**
See Lahore Board Answer No: 13

18. **Difference between Monocots and Dicots: -**
See Multan Board Answer No: 7

19. **Scientific Name and Name of Family: i) Tomato ii) Sheesham:**

| Family | Common Name | Scientific Name | Name of |
|--------|----------------|--------------------------------|------------|
| i. | Tomato | <i>Lycopersicum esculentum</i> | Solanaceae |
| ii. | Shesham | <i>Dalbargia sissoo</i> | Fabaceae |

20. **A) Annulus: -**

Annulus is three forth portion of the sporangium of *Adiantum* which consists of cells that have radial and inner walls thickened.

B) Stomium: -

It is the one forth portion of sporangium of *Adiantum* with thin walled cells.

21. **Names of the Classes of Division Bryophyta: -**

1. Hepaticopsida
2. Musci Bryopsida
3. Anthoceropsida

Rawalpindi Board Questions

1. Why are Bryophyte called Amphibian Plants? (A-2010)
2. Define Protonema in Bryophytes. (A-2010)
3. Name any two important Ferns. (A-2010)
4. Define Rhizome. (A-2011)
5. What are Amphibious Plants of the world? (A-2011)
6. What is Plannation in Leaf Evolution? (A-2011)
7. What is Protonema? (A-2012)
8. What is Circinate Vernation? (A-2012)
9. What is the Importance of Heterospory? (A-2012)
10. Give four examples of Gymnosperms given in your book. (A-2013)
11. Enlist botanical names of two genera of family Solanaceae. (A-2013)

Answers

1. **Bryophyte called Amphibian Plants: -**

See Multan Board Answer No: 4

2. **Protonema in Bryophytes: -**

See Lahore Board Answer No: 16

3. **Names of Any Two Important Ferns: -**

1. *Adantum*

2. *Pteris*

4. **Rhizome: -**

See Multan Board Answer No: 32

5. **Amphibious Plants of the world:**

See Dera Ghazi Khan Board Answer No: 15

6. **Plannation in Leaf Evolution: -**

See Multan Board Answer No: 3

7. **Protonema: -**

See Lahore Board Answer No: 16

8. **Circinate Vernation: -**

9. Importance of Heterospory: -

The evolution of heterospory was an essential step in the evolution of seeds.

10. Four Examples of Gymnosperms given in Book: -

1. *Cycas* --- Sago palm
2. *Pinus* ----Pine
3. *Cedrus*---Deodar
4. *Picea*---Hemlock

11. Botanical Names of Two Genera of Family Solanaceae: -

1. *Solanum tuberosum*
2. *Nicotina tabacum*

Sargodha Board Questions

1. Define Phylogenetic System of Classification. (A-2011)
2. What is Protonema? (A-2011)
3. Define Microphyll and Megaphyll. (A-2011)
4. What are fronds? (A-2013)
5. Define ovule. (A-2013)

Answers

1. Phylogenetic System of Classification: -

See Multan Board Answer No: 16

2. Protonema: -

See Lahore Board Answer No: 16

3. A) Microphyll: -

The leaf which has a single undivided vein (vascular supply) is known as Microphyll. Or

1. The microphyll or microphyll leaf is usually small.
2. It has a single vascular strand.
3. It probably evolved from small, projecting extensions of stem tissue.
4. Only one group of living plants, the club-mosses, has microphyll

leaves.

Example: *Lycopodium*

B) Megaphyll: -

The leaf which has divided veins and veinlets with an expanded leaf blade or lamina.

Or

1. Megaphyll leaf has more than one vascular strands.
2. It is probably evolved from stem branches in the same plane that

gradually filled

in with additional tissue to form many veined leaf.

Examples: Ferns and seed plants

4. Fronds: -

The leaves of Ferns to which sporangia are attached are called fronds.

5. Ovule: -

Faislabad Board
Questions

1. Differentiate between Fertilization and Double Fertilization. (A-2007)
2. List four adaptations of Bryophytes to land habitat. (A-2007)
3. Explain the evolution of Megaphyll. (A-2007)
4. Differentiate between Microphylls and Megaphylls. (A-2008)
5. Why Bryophytes are called Amphibians of the Plant? (A-2008)
6. Differentiate between Bryophytes and Tracheophytes. (A-2008)
7. What are Paraphyses? (A-2009)
8. Name the male and female organs of Bryophytes. (A-2009)
9. What is Webbing in the Evolution of Leaf? (A-2010)
10. Give scientific names of Shisham and Sweet Pea? (A-2010)
11. How does Angiosperm differ from Gymnosperms? Give two points. (A-2010)
12. Write the significance of of Alternation of Generation. (A-2011)
13. Define Overtopping and Plannation. (A-2011)
14. Why Shenopsids are called Arthropytes? (A-2011)
15. Why Bryophytes are called Amphibious Plants? (A-2012)
16. What are Arthropyte plants? Give example. (A-2012)
17. What are megaphylls? (A-2013)
18. Name two plants of family Solanaceae. (A-2013)

Answers

1. Differences between Fertilization and Double Fertilization: -

| Fertilization | Double Fertilization |
|---|--|
| 1. It is the fusion of two haploid (n) gametes which results in the formation of a diploid (2n) zygote. | 1. It is the process of two fertilizations, one fertilization results in the formation of diploid (2n) zygote whereas the second fertilization results in formation of |
| 2. It is the characteristic of all sexually reproducing organisms except flowering plants. | triploid (3n) endosperm. 2. It is the characteristic of flowering plants. |

2. Four Adaptations of Bryophytes to Land Habitat: -
See Multan Board Answer No: 27

3. Explain the Evolution of Megaphyll:
See Multan Board Answer No: 6

4. Differences between Microphylls and Megaphylls: -
See Multan Board Answer No: 3

5. Bryophyte called Amphibian Plants: -
See Multan Board Answer No: 4

6. Differences between Bryophytes and Tracheophytes: -

| Bryophytes | Tracheophytes |
|-------------------|----------------------|
|-------------------|----------------------|

| | |
|---|--|
| 1. They lack vascular tissue.. 2. They are typically quite small, few exceed seven centimeters in height.. 3. Bryophytes are the plants with a dominant gametophyte generation. Their sporophyte remain permanently attached and nutritionally dependent on the gametophyte. 4. All require water to reproduce sexually. 5. All are homosporous plants. | 1. They have water-conducting xylem and food-conducting phloem tissues in their stems, roots, and leaves. 2. They reach upto many meters in height. 3. Sporophyte of tracheophytes is dominant generation of the life cycle existing as free-living plant. The gametophyte is usually short-lived and degenerates once the sporophyte is established. 4. Some require water to reproduce sexually. 5. Some are homosporous while majority of plants are heterosporous. |
|---|--|

7.

Paraphyses: -

1.

Paraphyses are sterile hairs which are intermixed in the clusters of antheridia and archegonia in mosses.

2.

They presumably function in trapping moisture and preventing desiccation of the sex organs.
8.

Names of the Male and Female Organs of Bryophytes: -

1.

Male Organs of Bryophytes -Anthredia

2.

Female Organs of BryophytesArchegonia
9.

Webbing in the Evolution of Leaf: -

See Lahore Board Answer No: 17 (B)
10.

Scientific Names of Shisham and Sweet Pea: -

1.

Shisham -*Dalbergia sisso*

2.

Sweet Pea *Lathyrus odoratus*
11.

Differnce between Angiosperm and Gymnosperms (two points): -

See Multan Board Answer No: 14
12.

Significance of of Alternation of Generation: -

See Bahawalpur Board Answer No: 1
13.

Overtopping and Webbing: -

See Lahore Board Answer No: 17
14.

Shenopsids are called Arthrophytes: -

See Multan Board Answer No: 17

15. Bryophyte called Amphibian Plants: -

See Multan Board Answer No: 4

16. Arthropyte plants with Example:

See Gujranwala Board Answer No: 9

17. Megaphylls: -? (A-2013)

18. Two Plants of Family Solanaceae: -

1. Red Pepper (*Capsicum frutescens*)
2. Tomato (*Lycopersicum*)

Chapter No: 10 4 SQs

Multan Board

Questions

1. Write a note on Pseudocoelom. (A-2007)
2. Write a brief note on Metatheria. (A-2007)
3. Give characters of Dipnoi as an ancestor of Amphibians. (A-2007)
4. Write a brief note on Metamorphosis in insects. (A-2007)
5. Define Regeneration. (S-2007)
6. Explain Polymorphism in Coelenterates. (Model Paper-2006-08)
7. What is the importance of Archeopteryx? (Model Paper-2006-08)
8. Differentiate between Polychaeta and Oligochaeta. (Model Paper-2006-08)
9. Comment on Polymorphism. (A-2008)
10. What is Blastocoel? (A-2008)
11. What is Mantle? (A-2008)
12. What is Dipnoi? (A-2008)
13. What do you know about Metamorphosis? (S-2008)
14. Write a note on Beneficial Insects. (S-2008)
15. Write two examples of Metatheria. (S-2008)
16. What are Coral Reefs? (A-2009)
17. Name Classes of Arthropoda. (A-2009)
18. Define Nematocysts and also give their function. (S-2009)
19. What are two functions of Gastrovascular Cavity? (S-2009)
20. Give two characters of sub-class Eutheria. (S-2009)
21. How Annelids are advanced than Nematodes? (Two Points) (A-2010)
22. Name seven classes of sub-phylum Vertebrata. (A-2010)
23. What are the features of Duck Bill Platypus? (A-2010)
24. What is a Spiral and Determinate Cleavage? (S-2010)
25. Give four examples of Sponges. (S-2010)
26. Distinguish between Amniotes and An Amniotes. (S-2010)
27. Define the term Protandrous. (A-2011)
28. Define Coelenteron. (A-2011)
29. Explain Ecdysis. (A-2011)
30. How Crocodilian Heart is different from other Reptiles? (A-2011)
31. Differentiate between Acoelomates and Coelomates. (S-2011)
32. What is meant by Metamorphosis? (S-2011)
33. Why the name Cnidaria is given to Phylum Coelenterata? What is Gastrovascular Cavity? (S-2011)
34. What is Polymorphism? (A-2012)
35. What are three basic characters of Chordates? (A-2012)
36. Write down four differences between Water Habitat and Land Habitat. (A-2012)
37. Define the term Polymorphism. (A-2013-New)
38. What are Hermaphrodite Animals? (A-2013-New)

39. What is Radula? (A-2013-New)
 40. Define the term Metamorphosis. (A-2013-New)

Answers

1. Pseudocoelom: -

1. Pseudocoelom or False Body Cavity is the Space between Body Wall and Alimentary Canal which is not completely lined with mesoderm, instead its inner wall is lined with endoderm of the gut while its outer wall is lined with mesoderm of muscles.
 2. Pseudocoelom develops from blastocoel of embryo.
- Example:** Members of phylum Nematoda.

2. A brief Note on Metatheria: -

1. It is the sub-class of Mammalia.
 2. They are the most primitive mammals which have an abdominal pouch, the marsupium having nipples of mammary glands, hence are called Pouched Mammals or Marsupials or Marsupial Mammals.
 3. Marsupials are viviparous i.e. they give birth to live young ones. Their eggs are fertilized inside the female body. As eggs do not contain enough yolk to feed the embryo for the entire period of development, hence they are born in a very immature condition. Newborns crawl up into the marsupium where they attach to nipples of mammary glands and continue to develop to their maximum.
- Examples:** Opossum, Kangaroo and Tasmanian wolf found in Australia and America.

3. Characters of Dipnoi as an Ancestor of Amphibians:

They respire by the help of gills as well as, at times during draught period, by lungs which are actually the modified air bladders.

4. A brief Note on Metamorphosis in Insects: -

Metamorphosis is a morphological and physiological process that allows an organism to change abruptly from one distinct form to another during its life time. In general sense, metamorphosis is the transformation of an immature larval form into a sexually mature adult.

There are two types of metamorphoses:

a) Complete Metamorphosis or Holometabolous life cycle : -

Metamorphosis is said to be complete when egg hatches into a larva which develops into a resting stage, the pupa, which in turn transforms into an adult.

Examples: Mosquito, House fly.

b) Incomplete Metamorphosis or Hemimetabolous life cycle: -

Metamorphosis is said to be incomplete when egg hatches into a tiny immature adult like creature called nymph which grows directly into an adult.

Example: Head louse

5. **Regeneration: -**
The ability to regain or recover the lost or injured part of the body is called Regeneration.
6. **A) Polymorphism: -**
Polymorphism is the occurrence of structurally and functionally, in a species or in a colony, of more than one types of individuals or zooids (in case of colony).
- B) Polymorphism in Coelenterates:**
1. Occurrence of two or several body forms or morphs, in the individual of a species or in the colony of species, is an important character of Coelenterates.
 2. The life cycles of Coelenterates include two basic forms or morphs, Polyp or Hydroid and Medusa or Medusoid form, which alternate to each other and are either solitary or form colonies. In some Coelenterates one form is dominant and other is reduced. In still others one form is absent altogether.
 3. Beside these basic forms, a colony contains two or several kinds of members or zooids. A colony with two kinds of members is said to be dimorphic and containing more than two kind, polymorphic.
- Example:** *Obelia* is a common example of polymorphic polyp colony with Gastrozooids, feeding individuals or zooids and gonozooids, the zooids capable of reproduction. Its medusa is solitary, free swimming, sexually reproducing individual

7. **Importance of Archeopteryx: -**
1. *Archeopteryx* is thought to be earliest bird whose fossils have been found from the rocks of 150 million years old i.e. of Jurassic period.
 2. It forms the connecting link between Reptiles and Birds.

8. **Differences between Polychaeta and Oligochaeta:**

| Polychaeta | Oligochaeta |
|--|---|
| 1. They are mostly marine. 2. They have a distinct head with eyes, palp and tentacles. 3. Locomotary organs are Setae. 4. Sexes are usually separate. 5. Development passes through a Trochophore larval stage. Example: <i>Pheretima posthuma</i> , The common | 1. They may be terrestrial or aquatic 2. They do not have prominent or distinct head 3. Locomotary organs are Parapodia. 4. All are hermaphrodites. 5. No larva formed during development. Example: <i>Neries</i> , the Clam Worm |

| | |
|-----------|--|
| Earthworm | |
|-----------|--|

- 9. Polymorphism: -**
 Many Cnidarians live as a part of a large colony in which many individuals become physically attached to one another and occur in many different forms or zooids. These zooids are interdependent and perform special function for whole of the colony. The occurrence of a species in two or more structurally and functionally different kinds of zooids is known as Polymorphism.
Physalia is a common example of a polymorphic colony in which many types of polypoid and medusoid forms live together, in a colony, and perform specific function.
- 10. Blastocoel: -**
 Blastocoel is a hollow space filled by fluid known as Hemocoel and is situated in the blastula, an early stage in embryological development.
- 11. Mantle: -**
 1. Mantle is a thick, glandular, muscular fold of body wall that lies to either side (i.e.ventral and lateral) but does not completely enclose the visceral mass and may consist of one or two lobes.
 2. It may secrete calcareous shell and /or contribute to the development of gills or lungs.
 3. The space between the two folds of mantle is called Mantle Cavity which contains one or several pairs of respiratory gills and receives excretory , alimentary and reproductive openings.
- 12. Dipnoi: -**
 1. Dipnoi is a small group of lobed-finned bony fishes belonging to Order Dipnoi of Class Osteichthyes.
 2. They are abundant in fossil records of Devonian period.
 3. Today six species of lung fishes live in Africa, South America and Australia.
 4. They respire by the help of gills as well as, at times during draught period, by lungs which are actually the modified air bladders.
 5. It is thought that Amphibians have evolved from these fishes.
- 13. Metamorphosis: -**
 See Multan Board Answer No: 4
- 14. A note on Beneficial Insects:**
 1. Honey is produced by honey bees.
 2. Honey bees also yield bees wax used in polishes, candle etc.
 3. Silkworms supply the raw silk in the Orient and Europe..
 4. Scavanger insects, such as Blowflies, clean the environment by eating up dead animal and vegetable matter.
 5. Insects are the source of pollinations.
 6. Many insects are used in the biological control of harmful pests.
 7. Many insects, such as locust, are used as source of human food in many parts of the

world.

15. Two Examples of Metatheria:

Koala bear and Kangaroo are two examples of Metatheria.

16. Coral Reefs:

1. Coral reefs are underwater lime stone ridge or mound, the upper surface of which is near the surface of the sea.
2. They are formed by combining secretions of calcium carbonates of polyps of several species of corals and other carbon precipitating protest organisms. Coral reefs are found in the costal regions of Florida, West Indies, East Cost of Africa, Australia and Islands of Coral Sea

17. Names of Classes of Arthropoda:

Crustacea, Insecta or Hexapoda, Arachnida and Myriapoda are names of some of the classes of Arthropoda.

18. A) Nematocysts:

Nematocysts are stinging organelles in the epidermis, especially on tentacles of Cnidarians and are produced in the cells, the cnidocytes with small triggers (Cnidocoil) on their outer surface. There are many types of nematocysts but all basically consist of a fluid filled capsule and an enclosed, usually hollow, thread that is eversible. Some type of Nematocyst threads are sticky, others are long and coiled around prey. A third type bears barbs or spines and can inject a protein toxin that paralyses prey animals such as small crustaceans.

B) Functions:

1. Nematocysts are used to capture or paralyse the prey. Stimuli such as touch or chemicals dissolved in the water stimulates the the nematocyst to fire its thread.
2. They may also serve a defensive purpose.

19. Two Functions of Gastrovascular Cavity:

1. It serves as digestive cavity.
2. It also serves as body cavity.

20. Two Characters of sub-class Eutheria: -

1. They are viviparous and the young ones are born in a far more advanced and almost completely developed form.
2. A special organ called Placenta is formed in the uterus of the female and provides the connecting link between mother and its developing young. Embryo receives oxygen and nutrients from the mother's circulation and discharges the wastes into her blood through placenta.

21. Annelids are advanced than Nematodes (Two Points):

1. Annelids are the first group of invertebrates which has a circulatory system, of closed type with blood vessels, blood with hemoglobin and many hearts, transporting gases and nutrients, while circulatory system is absent in Nematodes.
2. Annelids have Coelom, the True Body Cavity around the alimentary canal filled with coelomic fluid which is formed by the splitting of mesoderm and is lined by thin layer of peritoneum that is also of mesdermal in origin, while Nematodes have less advance body cavity called False Body Cavity or Psedocoelom around the alimentary canal with fluid in it that is not formed by the splitting of mesoderm and is not lined by peritoneum layer and is derived from blastocoel.

22. Names of Seven Classes of sub-phylum Vertebrata: -

Followings are the names of seven classes of sub-pylum Vertebrata:

1. Cyclostoma
2. Chondrichthyes
3. Osteichthyes
4. Amphibia
5. Reptilia
6. Aves
7. Mammalia

23. Features of Duck Bill Platypus:

They are considered to be connecting link between reptiles and true mammals because they have both Reptilian and Mammalian Features.

a) Reptilian Features: -

- a) They lack external pinna.
- b) They are oviparous.
- c) They have cloaca and cloacal opening instead of separate openings for digestive system and urinogenital system.

b) Mammalian Features:

1. They possess hair or thick fur on their body.
2. Their females have mammary glands to feed their young.

24. A) Spiral Cleavage:

Planes of cleavage are not symmetrical between poles but are diagonal to the polar axis producing unequal cells called blastomeres around the axis of polarity.

B) Determinate Cleavage: -

Fate of each blastomere is foretold, hence all the blastomeres have determinated role to play in in the formation of embryo.

25. Four examples of Sponges:-

1. Sycon or Sypha---- A Typical Marine Sponge
2. Leucosolenia----- Glassy Marine Sponge
3. Spongilla----- Freshwater Sponge
4. Euplectella-----Venous Flower Basket

26. Differences between Amniotes and Anamniotes:

| | |
|----------|--|
| Amniotes | |
|----------|--|

| | |
|--|--|
| | Anamniotes |
| 1. They have fetal membranes. 2. Many lay eggs while others hatch young ones. Examples: Reptiles, Birds, Mammals. | 1. They lack fetal membranes. 2. They lay eggs only. Examples: Cyclostomes, Cartilage and Bony fishes, Amphibinas |

27. Protandrous:
The hermaphrodite sponges, in which male sex organs and male sex cells develop first and the female sex organs and female sex cells develop later and the cross fertilization is the rule, are called Protandrous. Or
These are the hermaphrodite animals in which male sex cells develop first.

28. Coelenteron: -
1. Coelenteron is a hollow cavity that is enclosed by the body wall of diploblastic organisms called Coelenterates.
2. Coelenteron is also known as Enteron or Gastrovascular Cavity.
3. It serves as sac like digestive cavity as well as body cavity
4. It opens to the outside by only one opening, the mouth.

29. A) Ecdysis: -
The mechanism of regular changing over of exoskeleton and the formation of new one is called moulting or ecdysis.
B) Explanation:
Exoskeleton, made up of non-livng water proof material known as chitin, is an important feature of Arthropoda. It covers whole of the body and appendages. As animal outgrows old exoskeleton is shed and after the growth of arthropod new exoskeleton is formed. This process of shedding old exoskeleton and formation of new one is called moulting or ecdysis.

30. Crocodilian Heart is different from other Reptiles: -
The heart of reptiles has two auricles and one incompletely partitioned ventricle while, the crocodiles have completely partitioned ventricle due to complete interventricle septum.

31. Differences between Acoelomates and Coelomates:

| Acoelomates | Coelomates |
|--|--|
| 1. They lack True Body Cavity or Coelom. 2. The space between body wall and the gut is filled by a loose cellular tissue called | 1. They have True Body Cavity or Coelom. 2. The space between body wall and the gut is enclosed by peritoneum |

| | |
|--|---|
| <p>mesenchyma or parenchyma.</p> <p>3. Digestive System is absent in some acoelomates but when present, is sac like with only one opening, the mouth.</p> <p>4. They lack circulatory and respiratory systems and poorly developed other systems.</p> <p>Examples: Members of Phylum Platyhelminthes.</p> | <p>layer and is filled by coelomic fluid.</p> <p>3. Digestive system is complete with two openings, mouth and anus.</p> <p>4. They have advanced organ systems.</p> <p>Examples: All members of phyla Annelida to Chordata</p> |
|--|---|

32.

Metamorphosis: -

See Multan Board Answer No: 4
33.

A)

Name Cnidaria given to Phylum Coelenterata:

The name Cnidaria is give to Phylum Coelenterata due to the presence of specialized cells called Cnidocytes. Each Cnidocyte has a fluid filled capsule called a nematocyst which is the organ for defense and offense for the animals.

B)

Gastrovascular Cavity: -

Gastrovascular cavity is a hollow cavity that is enclosed by the body wall of diploblastic organisms called Cnidarians and serves as sac like digestive cavity with only one opening mouth as well as body cavity.
34.

Polymorphism:

See Multan Board Answer No: 6 or 9
35.

Three Basic Characters of Chordates: -

1.

Notochord: -

It is dorsal supporting cylindrical hollow rod situated below the nerve cord and above the gut. The majority of vertebrates have an embryonic notochord that is replaced by the vertebral column during development.

2.

Nerve Cord:

All chordates have hollow, dorsal, tubular nerve cord. In vertebrates, the nerve cord, often called spinal cord, is protected by vertebrae. Its anterior portion becomes brain in most chordates.

3.

Pharyngeal gill slits:

These are paired openings found in all chordates at some stage during development. In the non-vertebrate chordates (e.g. fishes), these become functioning gills, while in terrestrial vertebrates, they are modified for various purposes.

Or

Chordates have a dorsal notochord, pharyngeal gill slits and a dorsal hollow nerve cord.
36.

Four differences between Water Habitat and Land Habitat:

1. Oxygen is more in the air than in water.
 2. Land affords a great variety of breeding places than water.
 3. Land habitat provides great variety of cover and shelter than aquatic habitat.
 4. Water, as a medium, provides greater support to the body than air.
- 37. Polymorphism: -**
See Multan Board Answer No: 6 or 9
- 38. Hermaphrodite Animals: -**
See Lahore Board Answer No: 10
- 39. Radula: -**
It is a rasping tongue like structure provided with many teeth in the mouth cavity of many Molluscs such as snail. It is used to scarp the food.
- 40. Metamorphosis: -**
See Multan Board Answer No: 4

- Bahawalpur Board

Questions
1. Differentiate between Radial and Bilateral Symmetry. (A-2007)
 2. What are Acoelomates? (A-2007)
 3. What are Coral Reefs? (A-2007)
 4. What are the parasitic diseases caused by the phylum Nematoda? (A-2007)
 5. Name three subclasses of Mammals with examples. (A-2008)
 6. What is the Importance of Archeopteryx? (A-2008)
 7. Explain Swim Bladder and its function. (A-2008)
 8. Describe the location and function of Nematocysts. (A-2008)
 9. What is Metamorphosis? (A-2009)
 11. What is Archeopteryx? Give two characters only. (A-2009)
 12. Define Polymorphism. Give examples. (A-2010)
 13. Name the classes of Phylum Chordata. (A-2010)
 14. State three Economic Importances of Molluscs. (A-2010)
 15. Calcareous Exoskeleton of Echinoderms may be called Endoskeleton. Why? (A-2011)
 16. Define the term Metameric Segmentation. (A-2011)
 17. What is Schizocoelous Coelom? (A-2011)
 18. What is the Importance of Archeopteryx? (A-2012)
 19. How Coral Reefs are formed? (A-2012)
 20. What is function of Swim Bladder? (A-2012)
 21. What are the functions of Placenta? (A-2012)
 22. Define Mammals. (A-2012)
 23. Define Placenta. (A-2012)
 24. What are Protandrous Animals? (A-2013)
 25. How Coelomates are different from Acoelomates? (A-2013)
 26. Define Blastocoel. (A-2013)
 27. What are reptilian features of Archeopteryx? (A-2013)

- ## Answers
- 1. Differences between Radial Symmetry and Bilateral Symmetry:**
- | Radial Symmetry | Bilateral Symmetry |
|---|---|
| It is that type of symmetry in which: a) Body parts of the animals are | It is that type of symmetry in which: a) Body parts of the animals are |

| | |
|---|--|
| <p>arranged around a central axis.</p> <p>b) Any division of the body along the central axis results into two similar halves.</p> <p>Or</p> <p>Any longitudinal plane divides the animal into two similar halves.</p> <p>c) There is no right or left side.</p> <p>Examples: -Members of Phylum Cnidaria</p> | <p>constructed along a plane running from a head to a tail region.</p> <p>b) Only one longitudinal plane cut down the centre of the animal will produce two equal halves.</p> <p>Or</p> <p>Only one plane divides the animal into two equal halves.</p> <p>c) There is definite right and left side.</p> <p>Examples: -Members of Phyla Annelida, Arthropoda, Chordata etc.</p> |
|---|--|

2.

Acoelomates: -

1.

Acoelomates are those animals which lack body cavity or coelom.

2.

In Acoelomates, mesoderm is packed solidly between the ectoderm and endoderm and contains various body organs.

3.

Mesoderm forms a loose, cellular tissue called mesenchyma or parenchyma.

4.

Digestive system is absent in some acoelomates but when present, is sac-like with only one opening, the mouth.

5.

Acoelomates have no anus, no circulatory system and no respiratory system.

6.

Nervous system consists of a simple net wok or plexus with some anterior concentration of neurons.

7.

The excretory system is of protonephridia, the basic unit of which is flame cell.

Example:

Members of phylum Platyhelminthes.

3.

Coral Reefs:

See Multan Board Answer No: 16

4.

Parasitic Diseases caused by the phylum Nematoda:

1.

Enterobiosis or Pinworm Infection:

a)

Causative Agent -- *Enterobius vermicularis*

b)

Common Name---- Pinworm or Seatworm

c)

Geographical Distribution----Cosmopolitan (Worldwide in Distribution) but more common in Europe and America

d)

Host----- Humans, especially Children

e)

Habitat-----Caecum, Colon and Appendix

f)

Symptoms---- Symptoms are associated with the migration of female out from the anus to lay her eggs on the perianal region at night.

Symptoms include:

i.

Intense itching of anus

ii.

Insomnia (loss of sleep), loss of appetite due to

inflammation of mucous
membrane of colon and appendix

2. **Ascariasis or Roundworm Infection:**

- a) **Causative Agent**----*Ascaris lumbricoides*
- b) **Common Name**-----Large Intestinal Roundworm
- c) **Geographical Distribution**----World wide in distribution, but more

common

in warm countries and areas of

poor sanitation

- d) **Host**-----Humans
- e) **Habitat**----Small intestine
- f) **Symptoms**
 - i. Vomiting and Abdominal pain
 - ii. Malnutrition in children
 - iii. Intestinal or appendix obstruction by adults in

heavy

infection

3. **Hookworm Infection:**

- a) **Causative Agent**-----*Ancylostoma duodenale, Nectar americanus*
- b) **Common Name**-----Old World Hookworm, New World Hookworm
- c) **Geographical Distribution**----*Ancylostoma duodenale* Asia, South

Africa,

South America and

Europe

Nectar americanus----North America and

Africa

- d) **Host**-----Humans
- e) **Habitat**-----Villi of Small intestine
- f) **Pathology**---- It is very dangerous because it holds the villi of

intestine and

sucks blood and body fluid. During feeding they

produce an

anticoagulant and after feeding leave the wound

bleeding.

- g) **Symptoms**-----Severe Anemia in Children, Physical and Mental

Retardation in

Children

5. **The Names of three sub-Classes: -**

- 1. **Prototheria**Examples: Duck Bill Platypus, Spiny Ant Eater (Echidna)
- 2. **Metatheria**Examples: Opossum, Kangaroo, Tasmanian wolf, Koala Bear
- 3. **Eutheria**Examples: Dolphin, Whale, Man, Rat, Bat, Elephant, Horse,

Mice

6. **Importance of Archeopteryx: -**

See Multan Board Answer No: 8

7. **A) Swim Bladder: -**

Swim bladder, in primitive bony fishes, is a dorsal outpocketing of the pharynx

behind the throat, while in most of today's bony fishes, the swim bladder

is an independent organ that is filled and drained of gases, mostly nitrogen and oxygen,

internally.

B) Function:

Swim bladder helps the fish regulate its buoyancy by increasing or decreasing the

amount of gas in the bladder via the oesophagus or a specialized net work of

capillaries.

Primitive bony fishes fill the swim bladder by simply gulping air at the surface of the water.
In today's bony fishes, gases are harvested from their blood by unique gland that discharges the gases into the bladder when more buoyancy is required.
To reduce buoyancy, gas is released by a muscular valve from the bladder back into the blood

supply.

Or

Swim bladder is an air sac present in bony fishes with or without the pharynx. It helps the fish regulate its buoyancy by increasing or decreasing the amount of gas in the bladder via the oesophagus or a specialized net work of capillaries.

8. A) Location of Nematocysts:

Nematocysts are mainly located in the epidermis, especially on tentacles.

B) Function of Nematocysts:

1. Nematocysts are used in capture of prey.
2. They may also serve a defensive purpose.

9. Metamorphosis: -

See Multan Board Answer No: 4

10. Swim Bladder and its Function:

See Bahawalpur Board Answer No: 7

11. A) *Archeopteryx*: -It is thought to be earliest bird whose fossils have been found

from the rocks of 150 million years old i.e. of Jurassic period

and forms the connecting link between reptiles and birds.

B) Two Characters of *Archeopteryx*:

1. They had the size of crow with two wings and skull similar to that of present day birds.
2. They had three claws at each wing and teeth in the jaw like socket similar to beak.

12. Polymorphism. with Examples: -

See Multan Board Answer No: 6

13. Names of the Classes of Phylum Chordata: -

1. Cyclostoma
2. Chondrichthyes
3. Osteichthyes
4. Amphibia
5. Reptilia
6. Aves
7. Mammalia

14. Three Economic Importances of Molluscs: -

1. Shells of Mollusks are used in button industry, used for making ornaments, and are mixed with tar for making roads in America.
2. *Teredo*, a shipworm, damages wooden parts of ship.
3. Slugs are harmful to plants in the garden and cultivation. They not only eat

leaves, but also destroy plants by cutting up their roots and stems.

15. Calcareous Exoskeleton of Echinoderms called Endoskeleton: -

The skeleton of members of phylum Echinodermata is composed of plates and spines of calcium carbonate and is of mesodermal in origin and are enclosed in a tissue hence the skeleton is truly an Endoskeleton. As the spines project outward from the skin, therefore skeleton is seemed to be Exoskeleton and account for the phylum name Echinodermata i.e. Spiny Skinned Animals.

16. Metameric Segmentation: -

Segmentation refers to the division of the body externally by constriction of the body surface into a number of similar parts or segments. The segmentation is said to be Metameric when external segmentation corresponds with internal segmentation due to development of coelomic compartments in the body by septa. Moreover some of organs such as excretory and reproductive organs are repeated internally and locomotary organs are repeated externally.

17. Schizocoelous Coelom: -

Schizocoelous Coelom is the Coelom formed by the splitting of mesoderm that arises from the cells located near the embryonic blastopore.

Examples: Members of Protostomes

18. Importance of Archeopteryx: -

See Multan Board Answer No: 8

19. Formation of Coral Reefs: -

Coral Reefs are formed by combining secretions of calcium carbonates of polyps of several species of corals and other carbon precipitating protest organisms.

20. :Function of Swim Bladder: -

It helps the fish regulate its buoyancy by increasing or decreasing the amount of gas in the bladder via the oesophagus or a specialized net work of capillaries.

21. Functions of Placenta:

1. The placenta provides nutrients and oxygen for the fetus from the mother blood.
2. Placenta removes wastes and carbon dioxide from the fetus to the maternal blood which the mother then excretes.
3. It also produces hormones that regulate pregnancy.

22. Mammals:

Mammals are amniotic, endothermic, vertebrates in which young ones are nourished by milk of mammary glands of females. Presence of hairs, four chambered heart with left aortic arch, diaphragm, two sets of teeth, external ear and non-nucleated RBC 's are characteristic features of these animals.

23. Placenta:

Placenta is the tissue of exchange between maternal blood and fetal blood which consists of the portion of the chorion of the embryo that develops villi, together with underlying uterine tissue that contains maternal capillaries and small pools of maternal blood.

24. Protandrous Animals: -

See Multan Board Answer No: 27

25. Coelomates different from Acoelomates: -

See Multan Board Answer No: 31

26. Blastocoel: -

See Multan Board Answer No: 10

27. Reptilian Features of Archeopteryx: -

See Dera Ghazi Khan Board Answer No: 9

Dera Ghazi Khan Board

Questions

1. Define Ecdysis. (A-2008)
2. What is Diaphragm? (A-2008)
3. What do you mean by Radial Symmetry? Give example. (A-2009)
4. Write about on Coral Reef. (A-2009)
5. Define Infestation. (A-2009)
6. Name any two beneficial insects and their products. (A-2010)
7. Name any two types of Larvae found in Echinoderms showing Bilateral Symmetry. (A-2010)
8. What is Syrinx? Where is it situated? (A-2010)
9. What are Reptilian Features of Archeopteryx? (A-2011)
10. Name seven classes of the sub-phylum Vertebrata. (A-2011)
11. What are fundamental features of Insects? (A-2011)
12. What is radial and bilateral symmetry in animals? (A-2013)
13. What is importance of sponges? (A-2013)
14. Give two examples of class oligochaeta. (A-2013)
15. Name two sub-classes of mammals with examples. (A-2013)

Answers

1. Ecdysis:

The mechanism of regular changing over of exoskeleton and the formation of new one is called moulting or ecdysis.

2. Diaphragm:

Diaphragm is a dome-shaped sheet of skeletal muscles which forms the floor of the chest in mammals and separates the thoracic cavity from abdominal cavity and functions in breathing.

Or

It is the muscular sheet in mammals which separates the chest cavity and lungs from the abdominal cavity and is involved in exchanging the air in and out of the lungs.

3. Radial Symmetry: -

It is a type of symmetry in which body parts of the animals are arranged around a

central axis and any division of the body along the central axis results into two similar halves.

Examples: Members of phylum Cnidaria.

4. Coral Reefs: -

See Multan Board Answer No: 16

5. Infestation: -

Infestation is the invasion, multiplication and growth of the parasites in the host.

6. Names of Two Beneficial Insects and their Products: -

1. Honey beeHoney, Wax
2. SilkwormSilk

7. Names of Two Types of Larvae found in Echinoderms showing Bilateral Symmetry:

Bipinnaria and Brachiolaria are the two types of larvae found in Echinoderms showing Bilateral Symmetry.

8. A) Syrinx: -

Syrinx is the organ of voice in birds.

B) Location: -

It is situated at the lower end of trachea near the origin of two bronchi.

9. Reptilian Features of Archeopteryx: -

1. It had solid bones, very few of which were fused to one another, feature of dinosaurian.
2. It had a long reptilian tail.
3. It had no enlarged breast bone.
4. It had forelimbs of a dinosaur.
5. Bones in the foot and shape and orientation of the pelvis is similar to those of theropods (Reptile).
6. It had three claws at each wing and teeth in the jaw like socket similar to beak.

10. Names of Seven Classes of the sub-phylum Vertebrata: -

See Multan Board Answer No: 22

11. Fundamental Features of Insects: -

1. The body has three distinct regions head, thorax and abdomen.
2. The thorax has three segments with three pairs of jointed legs.
3. They have a pair of antennae on the head.
4. They have compound eyes on the head.
5. A brain is composed of fused ganglia and double ventral nerve cord.
5. Sexes are separate.
6. Metamorphosis takes place during development.

12. A) Radial Symmetry in Animals: -

1. It is a type of symmetry in which any division of the body along the central axis results into two similar halves. Or
It is a type of symmetry in which any longitudinal plane divides the animal into two similar halves.

2. Body parts of radially symmetrical animals are arranged around a central axis.

3. Radially symmetrical animals have no right and left sides.

B) Bilateral Symmetry in Animals: -

1. It is a type of symmetry in which only one plane divides the animal into two

similar halves. Or

A type of symmetry in which only one longitudinal plane that cut down the

centre of the animal and produce two equal halves is called Bilateral Symmetry..

2. In bilaterally symmetrical animals, the body parts are constructed along a plane

running from head to tail region.

3. There is definite right and left sides in bilaterally symmetrical animals.

13. Importance of sponges: -

1. The skeleton of sponges have been used by man mostly for washing and bathing.

2. Sponges are used in surgical operations for absorbing fluids and blood.

3. They are also used for sound absorptions in buildings.

14. Two Examples of Class Oligochaeta: -

1. *Lumbricus terrestris*

2. *Pheretima posthuma*

15. Two Sub-classes of Mammals with Examples: -

1. Prototheria**Examples:** Duck Bill Platypus, Spiny Ant Eater (Echidna)

2. Metatheria**Examples:** Opossum, Kangaroo, Tasmanian wolf, Koala Bear

Lahore Board

Questions

1. Why Annelids and Arthropods are considered having same origin? (A-2006)
2. What is Hermaphrodite? (A-2007)
3. What is Coelom? (A-2007)
4. Differentiate between Diploblastic and Triploblastic Organisms. (A-2007)
5. What is the Economic Importance of Molluscs? (A-2007)
6. What are Diploblastic Animals? (A-2008)
7. Write the four names of Harmful Insects. (A-2008)
8. Define Placenta. What is its function? (A-2008)
9. Differentiate between Cold Blooded and Warm Blooded Animals. (A-2008)
10. What is Hermaphrodite animal? Give one example. (A-2009)
11. What is Polymorphism? (A-2009)
12. What are the Reptilian Features of Archepteryx? (A-2010)
13. What is a Gastrovascular Cavity? (A-2010)
14. Give the Economic Importance of Sharks. (A-2010)
15. Differentiate between Spiral and Radial Cleavage. (A-2011)
16. What is Syrinx? Where it is situated? (A-2011)
17. Write down Four Parasitic Adaptations of Flatworms. (A-2011)
18. What is Operculum? (A-2011)
19. What is Operculum? (A-2012)
20. Differentiate between Spiral and Radial Cleavage. (A-2012)
21. Write down Four Parasitic Adaptations in Flatworms. (A-2012)
22. Why Echinoderm places close to Chordates? (A-2012)
23. Define Polymorphism. (Group I-A-2013)
24. Differentiate between parazoa and eumetazoa. (Group I-A-2013)

25. Write down two characteristics of osteichthyes. (Group I-A-2013)
26. Write down two characteristics of amphibians. (Group I-A-2013)
27. Describe briefly skeleton of sponges. (Group II-A-2013)
28. What are gemmules? Give their function. (Group II-A-2013)
29. Write down two adaptations for parasitic mode of life in platyhelminthes. (Group II-A-2013)
30. Describe briefly two harmful insects. (Group II-A-2013)

Answer

1. **Annelids and Arthropods having Same Origin:** -
Annelids and Arthropods are considered having same origin because both share the characteristic of having body divided into similar segments.
2. **Hermaphrodite:** -
An organism that has both male and female sex organs is called Hermaphrodite.
Or
It is the type of animal that has both ovaries and testes.
Example: Members of phylum Platyhelminthes
3. **Coelom:** -
Coelom is defined as a cavity in the mesoderm lined by an epithelium, usually houses gonads and excretory organs and contains coelomic fluid.

4. **Differences between Diploblastic and Triploblastic Animals:**

| Diploblastic Animals | Triploblastic Animals |
|--|--|
| 1. Their body is made up of two cellular layers, an ectoderm and endoderm. Between them is the mesogloea, a non-cellular layer. 2. The animals have radial symmetry hence they belong to division Radiata. 3. Most of the organization of diploblastic animals is at the level of tissues. 4. There is sac like digestive system with only one cavity called gastrovascular cavity and one opening, the mouth. Examples: <i>Hydra, Obelia, Sea anemone</i> etc. | 1. Their body is made up of three cellular layers, ectoderm, mesoderm and endoderm. 2. The animals have bilateral symmetry hence they belong to division Bilateria. 3. These animals reflect organ level of organization. 4. They have tube within tube body plan. The digestive system has mouth at its anterior end and anus at the posterior end. Example: <i>Neries, Homo sapiens</i> etc |

5. **Economic Importance of Molluscs:** -

1. *Pearl oyster* makes valuable pearls naturally. Pearl culture industry is being successfully run in Japan and China by artificially making pearls in *Pearl oyster*.
2. Shells of Molluscs are used in button industry, used for making ornaments, and are mixed with tar for making roads in America.
3. *Teredo*, a shipworm, damages wooden parts of ship.
4. Slugs are harmful to plants in the garden and cultivation. They not only eat leaves, but also destroy plants by cutting up their roots and stems.

6. Diploblastic Animals: -

- Between
1. Their body is made up of two cellular layers, an ectoderm and endoderm. them is the mesogloea, a non-cellular layer.
 2. The animals have radial symmetry hence they belong to division Radiata.
 3. Most of the organization of diploblastic animals is at the level of tissues.
 4. There is sac like digestive system with only one cavity called gastrovascular cavity and one opening, the mouth.

Example: *Hydra, Obelia*, Sea anemone etc

7. Four Harmful Insects: -

1. Locust
2. Wasp
3. House fly
4. Female Mosuitoes

8. Placenta:

Placenta consists of the portion of the chorion of the embryo that develops villi, together with underlying uterine tissue that contains maternal capillaries and small pools of maternal blood.

Functons of Placenta:

1. The placenta provides nutrireints and oxygen for the fetus from the mother blood.
2. Placenta removes wastes and carbon dioxide from the fetus to the maternal blood which the mother then excretes.
3. It also produces hormones that regulate pregnancy.

9. Differences between Cold Blooded and Warm Blooded Animals:

| Cold Blooded Animals | Warm Blooded Animals |
|--|---|
| <ol style="list-style-type: none"> 1. These are the animals whose body temperature varies as the external temperature changes. 2. They have lower metabolic rates at colder temperatures <p>Examples: -Fishes, Amphibians, Reptiles</p> | <ol style="list-style-type: none"> 1. These are the animals which maintain a constant body temperature that is generally higher than the environmental temperature, regardless of the external temperature. 2. They all have high metabolic rates. <p>Examples: -Birds and Mammals</p> |

10. A) Hermaphrodite Animal:
 An animal that has both male and female sex organs i.e. testes and ovaries is called Hermaphrodite.
B) Example: Earthworm

11. Plymorphism: -
 See Multan Board Answer No: 9

12. Differences between Cold Blooded and Warm Blooded Animals:
 See Lahore Board Answer No: 9

13. Gastrovascular Cavity: -
 Gastrovascular cavity is a hollow cavity that is enclosed by the body wall of diploblastic organisms called Cnidarians and serves as sac like digestive cavity with only one opening mouth as well as body cavity.

14. Economic Importance of Sharks: -
 1. Some sharks are highly destructive to fish lobster and crabs because they ingest tons of these small crustaceans.
 2. Liver oil of sharks is used in medicine as source of vitamins A and D.
 3. Shark skin leather is used for making articles.

15. Differences between Spiral and Radial Cleavage:

| Spiral Cleavage | Radial Cleavage |
|--|--|
| 1. Lines or planes of cleavage are not symmetrical between poles but are diagonal to the polar axis. 2. Unequal cells around the axis of polarity are produced i.e. at the eight cell stage the upper four cells (blastomeres) of the embryo are rotated 45 relative to the four lower blastomeres. Example: Members of group Proterostoma. | 1. Planes of cleavage are symmetrical to the polar axis. 2. The upper blasomeres of the embryo at eight cell stage are directly above the lower blastomeres. Example: Members of Group Deuterostoma |

16. Syrinx and its Location: -
 See Dera Ghazi Khan Board Answer No: 8

17. Four Parasitic Adaptations of Flatworms: -
 1. Absence of epidermis and presence of resistant cuticle for protection against host enzymes
 2. Development of adhesive organs such as suckers and hooks for the attachment to the host

3. Degeneration of muscular and nervous systems
4. Simplification or complete absence of digestive system due complete dependence on the host

18. Operculum: -

It is a flat bony external protective covering over gill chamber in bony fishes.

Or

It is lateral bony protective flap of body wall that extends posteriorly from the head and covers the gills, in bony fishes.

19. Operculum: -

See Lahore Board Answer No: 18

20. Differences between Spiral and Radial Cleavage: -

See Lahore Board Answer No: 15

21. Four Parasitic Adaptations in Flatworms: -

See Lahore Board Answer No: 17

22. Echinoderms placed Close to Chordates: -

Echinoderm places close to Chordates because it has following characters similar to chordates.

1. It is, like Chordates, deuterostome in which cleavage is radial, anus develops from blastopore, coelom is enterocoelous (i.e. develops as out pouching of archenteron) and mesoderm is derived from the cells close to blastopore.
2. It possesses mesodermal endoskeleton.
3. Its early development is almost similar to lower chordates.

23. Polymorphism: -

See Multan Board Answer No: 9

24. Differences between Parazoa and Eumetazoa: -

See Sargodha Board Answer No: 6

25. Two Characteristics of Osteichthyes: -

1. They have bony skeleton.
2. They have a swim bladder that helps in buoyancy. Or
1. They have ganoid, cycloid or ctenoid scales, lacking placoid scales.
2. They have brain with 10 pairs of cranial nerves. Or
1. They have terminal mouth having jaws with or without teeth.
2. They respire by gills supported by bony gill arches and covered by operculum.

26. Two Characteristics of Amphibians: -

1. They have smooth and moist skin with many glands and without scale.
 2. They are cold blooded (poikilothermic) animals and hibernate in winter.
- Or
1. They respire by gills in the larval stage and by lungs and skin in the adult.
 2. They are anamniotes.

27. Brief Description of Skeleton of Sponges: -

The skeleton is in the form of variously shaped needle like structures called spicules. They

may be calcareous or siliceous. Some sponges have skeleton of sponging fibers such as bath

sponges. The skeleton is present among pinacocytes and provides support.

Spicules are also

present around osculum and ostia. Or

1. Some sponges have needle shaped lime (calcium carbonate) crystals called spicules.

2. Some sponges have siliceous spicules (glass material) with six rays. Some have

siliceous spicules but never six rayed.

3. Some sponges have skeleton of proteinaceous fibers called sponging fibers either with or without spicules.

28. A) Gemmules: -

Gemmules are internal buds in sponges. Or

Gemmules are nutrient laden ameoboid cells surrounded by layers of epithelial cells in

sponges. They are called internal buds formed during unfavorable conditions and are

resistant to drought or winter.

B) Function of Gemmules: -

They develop into new sponges. Or

Under favourable conditions they grow into new sponges.

29. Two Adaptations for Parasitic Mode of Life in Platyhelminthes: -

1. Neurosensory organs are not developed due to their passive mode of life.

2. Alimentary canal is reduced and even absent in some platyhelminthes.

30. Brief Description of Two Harmful Insects: -

1. Mosquitoes:

Mosquitoes belongs to class insecta or hexapoda of phylum arthropoda.

They have

many genera, among which *Anopheles*, *Culex* and *Aedes* are very important vectors.

Anopheles transmit *Plasmodium* (the causative agent of Malaria), *Wuchereria bancrofti*

(the causative agent of Elephantiasis) and several viruses. *Culex* is a vector of several

arthropod born viruses. *Aedes* is also the vector of: several viruses such as Dengue

(DEN) types 1-4, Yellow Fever (YF) etc.

2. Locust:

They move in large numbers from country to country and cause damage to standing

crops.

Gujranwala Board

Questions

1. Give two characters of Chordates. (A-2006)
2. What is Polymorphism? (A-2007)
3. What is the difference between Acoelomata and Coelomata? (A-2007)
4. Give four characters of phylum Nematoda. (A-2007)
5. Name the Phylum of Starfish. (A-2007)
6. What are Triploblastic Animals? (A-2008)
7. Give two examples of phylum Platyhelminthes. (A-2008)
8. Write down two characters of phylum Annelida. (A-2008)
9. Give names of any two Sub-classes of Mammalian. (A-2008)

10. Differentiate between Acrania and Craniata. (A-2009)
11. Differentiate between Schizocoelous and Enterocoelous. (A-2009)
12. Assign following animals into their Respective Phyla. (A-2010)
 - i. Tapeworm
 - ii. Octopus
13. Give two examples of sub-class Metatheria. (A-2010)
14. Differentiate between Infestation and Disinfestation. (A-2010)
15. Summarize Importance of Sharks. (A-2011)
16. Differentiate Corals from Coral Reef. (A-2011)
17. Write down Affinities of Echinoderms with Hemichordates. (A-2011)
18. Differentiate between Nerve Cord and Notochord. (A-2012)
19. Give examples of Metatheria. (A-2012)
20. What is Metamorphosis? (A-2012)
21. What are gammules? (A-2013)
22. What are diploblastic and triploblastic animals? (A-2013)
23. What do you know about nematocysts? (A-2013)
24. What is coelom? (A-2013)

Answers

1. **Two Characters of Chordates:**

1. It is flexible cartilaginous skeletal rod which forms in the early stage in the embryos of all chordates. It extends the length of the body and persists in a few chordates throughout their life whereas in most of them is surrounded and replaced by a vertebral column.
2. In all chordates, in an early embryonic stage, walls of pharynx become perforated and these pores are called Pharyngeal Slits. In aquatic forms these pharyngeal slits develop gills whereas in terrestrial forms they close, disappear or modified.

2. **Polymorphism: -**

See Multan Board Answer No: 6

3. **Difference between Acoelomata and Coelomata: -**

See Multan Board Answer No: 31

4. **Four Characters of phylum Nematoda: -**

1. Pseudocoelom or False Body Cavity, a cavity formed from Blastocoel of Blastula
2. Cylindrical, Unsegmented, Bilaterally Symmetrical body tapering at both ends
3. Complete Intestine with two openings, mouth and anus
4. Separate Sexes

5. **Name of the Phylum of Starfish: -**

The Phylum of Starfish is Echinodermata.

6. **Triploblastic Animals:**

1. Their body is made up of three cellular layers, ectoderm, mesoderm and endoderm.
2. The animals have bilateral symmetry hence they belong to division Bilateria.
3. These animals reflect organ level of organization.
4. They have tube within tube body plan. The digestive system has mouth at its anterior end and anus at the posterior end.

Examples: *Neries*, *Homo sapiens* etc

7. **Two Examples of phylum Platyhelminthes:**

- 1. *Planaria*
- 2. *Fasciola hepatica*

8. **Two Characters of phylum Annelida: -**

- 1. They are metamerically segmented.
- 2. They have Closed Blood Vascular System.

9. **Two Sub-Classes of Mammalian:**

- 1. Prototheria
- 2. Eutheria

10. **Differences between Acrania and Craniata:**

| Acrania | Craniata |
|--|---|
| 1. They are simple chordates in which Brain Box or Cranium is absent hence head is not prominent. | 1. These are complex chordates in which brain is protected inside a Brain Box or Cranium made up of bone or cartilage hence they have a distinct or well differentiated head. |
| 2. They are also called Protochordates because in these animals notochord does not transform into vertebral column and is retained as such. Examples: -Amphioxus, Salpa, Molgula | 2. They are also called Vertebrates because in these animals notochord is replaced by a vertebral column. Examples: -All Fishes, Amphibians etc |

11. **Difference between Schizocoelous and Enterocoelous:**

| Schizocelous | Enterocoelous |
|--|---|
| It is the type of development of coelom in which coelom is formed due to splitting of mesoderm. Example: It is characteristic of Proterostomes. | It is the type of development of coelom in which coelom is formed as a cavity within mesoderm produced by out pocketing of primitive gut, the archenteron. Example: It is characteristic of Deuterostomes. |

12. **Respective Phyla of Tapeworm and Octopus: -**

| Animal | Phylum |
|-------------|-----------------|
| i. Tapeworm | Platyhelminthes |
| ii. Octopus | Mollusca |

13. **Two Examples of sub-class Metatheria: -**

Opossum and Tasmanian wolf are two examples of sub-class Metatheria.

- 14. Difference between Infestation and Disinfestation: -**
 Infestation is the invasion, multiplication and growth of the parasites in the host, while
 disinfestation includes all those preventive measures which save the host to be infested.
- 15. Importance of Sharks: -**
 See Lahore Board Answer No: 14

16. Differences between Corals and Coral Reefs: -

| Corals | Coral Reefs |
|---|---|
| 1. Corals are solitary or colonial polyps belonging to phylum Coelenterata that have a calcium carbonate (lime stone) exoskeleton. 2. These are the polyps which donot usually occur individually, rather they form colonies and form mutualistic associations with Zooxanthella and other algae. 3. There are several species of corals. | 1. Coral reefs are areas of biological abundance found in shallow, warm, tropical waters just below the surface. 2. These are big stony masses made up of millions of Corals, the other constituents of which, are animals that have a calcium carbonate exoskeleton and calcareous red and green algae especially Zooxanthella. 3. There are several types of coral Reefs. |

- 17. Affinities of Echinoderms with Chordates:**
 1. They are, like Chordates, deuterostome in which cleavage is radial, anus
 develops from blastopore, coelom is enterocoelous (i.e.develops as out
 pouching of archenteron) and mesoderm is derived from the cells close to
 blastopore.
 2. They possess mesodermal endoskeleton.
 3. Their early development is almost similar to lower chordates.

18. Differences between Notochord and Nerve Cord:

| Notochord | Nerve cord |
|--|--|
| 1. It is flexible cartilaginous skeletal rod which appears in all embryos of chordates. 2. In some chordates it is present as such in adults while in majority of chordates it changes into vertebral | 1. It is a hollow tubular cord which is a part of nervous system of the animal and is present in embryo as well as in adults. 2. It becomes differentiated into spinal cord and brain in vertebrates. |

| | |
|---|--------------------------------|
| column. 3. It is mesodermal in origin. | 3. It is ectodermal in origin. |
|---|--------------------------------|

19. **Examples of Metatheria:** -
Opossum, Kangaroo, Koala Bear and Tasmanian wolf are some of the examples of Metatheria.
20. **Metamorphosis:** -
See Multan Board Answer No: 4
21. **Gammules:** -
See Lahore Board Answer No: 28 (A)
22. **A) Diploblastic Animals:** -
See Lahore Board Answer No: 6
B) Triploblastic Animals: -
See Gujranwala Board Answer No: 6
23. **Nematocysts:** -
See Multan Board Answer No: 18
24. **Coelom:** -
See Lahore Board Answer No: 3

Rawalpindi Board

Questions

1. Distinguish Coelom from Pseudocoelom. (A-2010)
2. Give two Functions of Placenta. (A-2010)
3. Define Coral Reefs. (A-2011)
4. Why Reptiles became extinct? (A-2011)
5. Why the name Cnidaria has been given to Coelenterates? (A-2011)
6. Differentiate Pseudocoelomate and Coelomate. (A-2012)
7. What are Tunicates? (A-2012)
8. Write a note on Useful Insects. (A-2012)
9. Define polymorphism. (A-2013)
10. Describe briefly about hook worm. (A-2013)
11. Differentiate between ostia and osculum. (A-2013)
12. Write down two affinities of Echinodermata with Hemichordata. (A-2013)

Answers

1. **Differences between Coelom and Pseudocoelom:**

| Coelom | Pseudocoelom |
|---|---|
| 1. It is developed as a cavity within the mesodermal tissue. | 1. It develops from the blastocel of the embryo. Its inner wall is of the endoderm while its outer wall consists of mesoderm. |
| 2. It is bounded, on all sides, by a mesodermal membrane, the peritoneum. | 2. It is not lined by coelomic epithelium or the peritoneum. |
| 3. Organs, bounded by peritoneum lie in the | 3. Organs float in the |

| | |
|---|--|
| coelomic fluid. Examples: -Members of phyla Annelida, Arthropoda, Mollusca, Echindoemata, Hemichordata and Chordata. | fluid within pseudocoel and are not surrounded by any membrane. Example: Members of phylum Nematoda. |
|---|--|

2. **Two functions of Placenta:** -
1. The placenta provides nutritients and oxygen for the fetus from the mother blood.
2. Placenta removes wastes and carbon dioxide from the fetus to the maternal blood
which the mother then excretes.
3. **Coral Reefs:** -
Coral reefs are areas made up of millions of Corals in shallow, warm, tropical waters just
below the surface and houses algae such as red algae and microscopic alga called
Zooxanthella that form mutualistic association with them.
4. **Extinction of Reptiles:**
Reptiles became extinct in tertiary period because the climate became less favourable to
them, as compared to the period when they flourished.
5. **The Name Cnidaria given to Coelenterates:-**
The name Cnidaria has been given to Coelenterates due to the presence of specialized cells
called Cnidocytes. Each Cnidocyte has a fluid filled capsule called a nematocyst which is
the organ for defense and offense for the animals.

6. **Differences between Pseudocoelomates and Coelomates:**

| Pseudocoelomates | Coelomates |
|--|--|
| 1. They have false body cavity or pseudocoelom or pseudocoel. | 1. They have true body cavity or coelom. |
| 2. Their cavity develops from blastocoel of embryo. | 2. Their cavity develops from mesoderm. |
| 3. Their cavity is not lined by any membrane. | 3. Their cavity is lined by a layer of peritoneum that is also of mesodermal in origin. |
| 4. Their organs are not enclosed by any membrane. | 4. Their organs are enclosed within a layer of Peritonium. |
| Examples: Members of phylum Nematoda | Examples: All members of phyla Annelida to Chordata. |

7. **Tunicates:** -
These are lower chordates in which adults are sessile and typically enclosed by

protective covering, the tunio, while their larvae are free-swimming and have hollow

dorsal nerve cord and notochord in the tail.

Example: *Molgula*

8. Useful Insects: -

See Multan Board Answer No: 14.

9. Polymorphism: -

See Multan Board Answer No: 6

10. Hook Worm: -

See Bahawalpur Board Answer No: 4 (3)

11. Difference between Ostia and Osculum: -

Ostia are numerous small pores in sponges through which water enters the body

while osculum is usually a single large pore in the sponges by which water leaves the body.

12. Two Affinities of Echinodermata with Hemichordata: -

1. Echinodermata have mesodermal endoskeleton like Hemichordata.
2. In both Echinodermata and Hemichordata mesoderm is derived from the cells close to the blastopore.

Sargodha Board

Questions

1. Differentiate between Radial and Bilateral Symmetry. (A-2010)
2. Discuss the Importance of Sponges. (A-2010)
3. What is meant by Disinfestation? (A-2010)
4. Differentiate between Amniotes and an Amniotes. (A-2011)
5. Define Polymorphism. What type of Polymorphism is found in Obelia? (A-2011)
6. Differentiate between Parazoa and Eumetazoa. (A-2011)
7. Define the term Regeneration. (A-2013)
8. Differentiate between infestation and disinfestation. (A-2013)
9. What is madreporite? (A-2013)
10. Write down the scientific names of Pin worm and Hook worm. (A-2013)

Answers

1. Differences between Radial and Bilateral Symmetry: -

See Bahawalpur Board Answer No: 1

2. Importance of Sponges: -

1. Sponges have great capacity to absorb water and are used in surgical operations for absorbing fluids and blood.
2. They are used for sound absorption in buildings.
3. They have long been used by man for washing and bathing.

3. Disinfestation:

Disinfestation is meant by all those preventive measures which save the host to be infested.

4. Differences between Anamniotes and an Amniotes: -

See Multan Board Answer No: 25

5. **A) Polymorphism:**
 Polymorphism is the occurrence of structurally and functionally, in a species or in a colony, of more than one types of individuals or zooids (in case of colony).
- B) Type of Polymorphism in *Obelia*:**
Obelia has colonial polyp and solitary medusa.
 Colonial polyp consists of hollow root like thread from which arise branching stem
 with three types of zooids i.e. hydranths, blastostyle and medusa buds.

6. **Differences between Parazoa and Eumetazoa:**

| Parazoa | Eumatazoa |
|---|--|
| 1. This subkingdom of kingdom Animalia includes simplest animals. | 1. This subkingdom of kingdom Animalia includes simple to highly complex animals. |
| 2. Parazoa is group of animals comprised of cells that do not work together in a coordinated manner and are not organized into tissues. | 2. These animals are multi-cellular in which cells are organized into tissues, organs and organ systems. |
| 3. They are asymmetrical. | 3. They are symmetrical. |
| 4. They have indeterminate shape. | 4. They have determinate shape. |
| 5. This subkingdom includes only one phylum, Phylum Porifera. | 5. This subkingdom includes all other phyla. |
| Examples: <i>Sycon</i> , <i>Spongilla</i> etc. | Examples: <i>Hydr</i> , <i>Nerie</i> , <i>Homo sapiens</i> etc. |

7. **Regeneration: -**
 It is the ability of a living organism to reconstruct its lost parts of the body.
8. **Differences between Infestation and Disinfestation: -**
 See Faislabad Board Answer No: 19
9. **Madreporite: -**
 Madreporite is a sieve like plate present on aboral body surface of echinoderms.
10. **A) The Scientific Name of Pin worm**
 Enterobius vermicularis
- B) The Scientific Name of Hook Worm: -**
 Ancylostoma deudenale

Faislabad Board
Questions

- Differentiate between Acoelomata and Coelomata. (A-2007)
- Give four characteristics of Phylum Echinodermata. (A-2007)
- What is Polymorphism? (A-2007)

4. What are the functions of Placenta? (A-2007)
5. Distinguish between Diploblastic and Triploblastic Animals. (A-2007)
6. What are Parazoa and Metazoa? (A-2008)
7. What are Nematocysts? Give their function. (A-2008)
8. Give the names of Four Harmful Insects.c (A-2008)
9. What is Metameric Segmentation? In which phylum is it present? (A-2008)
10. Differentiate between Diploblastic and Triploblastic Organization. (A-2009)
11. What are Harmful Insects? Give two names. (A-2009)
12. Give two Commercial Importances of Sharks. (A-2009)
13. What is Polymorphism? Give example. (A-2010)
14. Write down four characteristics of Mammals. (A-2010)
15. What is Metamorphosis? (A-2010)
16. Define Hermaphrodite. Give example from animals. (A-2011)
17. Differentiate between Nerve Cord and Notochord. (A-2011)
18. Define Gastrovascular Cavity in Coelenterates. (A-2011)
19. Compare Infestation and Disinfestation. (A-2011)
20. Differentiate between Acoelomata and Coelomata. (A-2012)
21. What is Notochord? State its function. (A-2012)
22. Name the bones of Mammalian Ear. Give their number. (A-2012)
23. Describe the role of swim bladder in fishes. (A-2013)
24. How coral reefs are formed? (A-2013)
25. Describe incomplete metamorphosis. (A-2013)
26. What is protandrous with reference to sponges production? (A-2013)

Answers

1. **Difference between Acoelomata and Coelomata: -**

See Multan Board Answer No: 31

2. **Four Characteristics of Phylum Echinodermata: -**

1. They are triploblastic, coelomates and spiny skinned animals which are found only in seas and oceans.
2. They are characterized as Deuterostomes in their mode of development.
3. Their larvae such as bipinnaria and brachiolaria are complex and exhibit bilateral symmetry while their adults are simple and show radial symmetry.
4. The unique characteristic of echinoderms is that a water vascular system (a complex system of tubes and tube feet in which water circulates) is present in them.

3. **Polymorphism: -**

See Multan Board Answer No: 9

4. **Functions of Placenta:**

1. The placenta provides nutrients and oxygen for the fetus from the mother blood.
2. Placenta removes wastes and carbon dioxide from the fetus to the maternal blood which the mother then excretes.
3. It also produces hormones that regulate pregnancy.

5. **Differences between Diploblastic and Triploblastic Animals: -**

See Lahore Board Answer No: 2

6. **Parazoa and Metazoa: -**

See Sargodha Board Answer No: 6

7. **A) Nematocysts:**

Nematocysts are produced in the unique cells Cnidocytes of Cnidaria and consist of a fluid filled capsule and an enclosed, usually hollow, thread that is eversible at the time of predation.

B) Function of Nematocysts:

1. Nematocysts are used in capture of prey.
2. They may also serve a defensive purpose.

8. Four Harmful Insects: -

1. Locust
2. Wasp
3. House fly
4. Female Mosquitoes

9. A) Metameric Segmentation: -

Metameric Segmentation refers to the division of the body externally by constriction of the body surface into a number of similar parts or segments and internally into coelomic compartments in the body by septa. Moreover some of organs such as excretory and reproductive organs are repeated internally and locomotary organs are repeated externally.

B) Phylum:

Metameric Segmentation is present in the phylum **Annelida**.

10. Differences between Diploblastic and Triploblastic Organization: -

See Lahore Board Answer No: 4

11. A) Harmful Insects:

Harmful Insects are those insects whose adults or larvae directly harm the humans, animals or plants or they transfer dangerous pathogens from one human or animal to others. They are not only health hazard but also cause economic loss to man by destroying his property and crops.

B) Names:

1. Female Anophelese mosquitoes transfer malarial parasites (*Plasmodium*) from patient to normal persons.
2. Locusts cause damage to standing crops and other plants.

12. Two Commercial Importances of Sharks: -

1. Liver oil of sharks is used in medicine as source of vitamins A and D.
2. Shark skin leather is used for making articles.

13. Polymorphism with Examples: -

See Multan Board Answer No: 6 or 9

14. Four characteristics of Mammals: -

1. Mammals are the vertebrates in which young ones are nourished by milk of mammary glands of female.
2. They have a body covering of hair, however in a few hair is modified into scales or spines.
3. They have external ear or pinna.

4. They have muscular sheet of Diaphragm that separates the thoracic and abdominal cavities.

15. **Metamorphosis:** -
See Multan Board Answer No: 4

16. **A) Hermaphrodite:**
An organism that has both male and female sex organs is called Hermaphrodite.

B) Example from Animals: Earthworm

17. **Differences between Nerve Cord and Notochord:**
See Gujranwala Board Answer No: 18

18. **Gastrovascular Cavity in Coelenterates:** -
Gastrovascular cavity is a hollow cavity that is enclosed by the body wall of diploblastic organisms called Coelenterates and serves as sac like digestive cavity with only one opening mouth as well as body cavity.

19. **Comparison of Infestation and Disinfestation:**

| Infestation | Disinfestation |
|---|---|
| 1. Infestation is the invasion, multiplication and growth of the parasites in the host | 1. Disinfection includes all those preventive measures which save the host to be infested. |
| 2. Larvae of the Taenia in the muscles of cow gains entry into the human intestine by ingestion of improperly cooked infected beef. | 2. Care should be taken to cook beef properly before eating. |
| 3. Larvae develop in the intestine of human into adults which are attached with the intestine of human by suckers and hooks on their heads. | 3. When the parasite has entered into the Human intestine and it becomes adult then certain medicines must be taken to remove it. Its complete removal is necessary because if only head remains inside the intestine of human it can grow into new tapeworm once again. Physicians also give anema to patient to fully remove the parasites. |

20. **Differences between Acoelomata and Coelomata:** -
See Multan Board Answer No: 31

21. **A) Notochord:** -
Notochord is a rod like semi-rigid body of vacuolated cells filled with protenaceous material that lies below the nerve cord and and above the gut. It is

possessed by all members of the phylum Chordata either in the larval or embryonic stages or throughout life.

B) Function:

Its primary function is to support or stiffen the body that is to act as skeletal axis.

22. Names the bones of Mammalian Ear

Malleus, Incus, Stapes

Numbers

Three

23. Role of Swim Bladder in Fishes: -

It helps the fish to regulate its buoyancy by increasing or decreasing the amount of gas in the bladder via the oesophagus or a specialized net work of capillaries.

24. Formation of Coral Reefs: -

See Bahawalpur Board Answer No: 19

25. Incomplete Metamorphosis: -

See Multan Board Answer No: 4 (b)

26. Protandrous with reference to Sponges Production: -

Chapter No: 11 2 SQs

Multan Board

Questions

1. What is the Products of Light Reactions? (A-2007)
2. Define Chemiosmosis. (S-2007)
3. What is meant by Compensation Point? (Model Paper-2006-08)
4. Compare Aerobic and Anaerobic Respiration. (Model Paper-2006-08)
5. What is meant by Preparatory and Oxidative Phase of Glycolysis? (A-2008)
6. What is the End Product of Anaerobic Respiration in Human? (A-2008)
7. Where do the reactions of TCA cycle occur? (A-2008)
8. What is Compensation Point? (A-2008)
9. What is Action Spectrum? (S-2008)
10. Write down the formula of Chlorophyll "a". (S-2008)
11. What is Chemiosmosis? (S-2008)
12. What do you know about Absorption Spectrum? (A-2009)
13. Give the Molecular Formula of Chlorophyll "a". (A-2009)
14. What is Lactic Acid Fermentation? Give its reaction. (A-2009)
15. Differentiate between Chlorophyll a and b with the help of chemical formula. (S-2009)
16. Define Chemiosmosis(S-2009)
17. What are Cytochromes? (S-2009)
18. What is meant by Compensation Point? (A-2010)
19. Define Chemiosmosis. (A-2010)
20. Differentiate between Absorption Spectrum and Action Spectrum. (A-2010)
21. What is meant by Photolysis? (S-2010)
22. Define Photosynthesis with equation. (S-2010)
23. Why Calvin Benson Cycle is known as C-3 Pathway? (S-2010)
24. Differentiate between Absorption and Action Spectrum. (A-2011)
25. What is Cyclic Phosphorylation? Give cause of its occurrence. (A-2011)
26. Define Bioenergetics. (S-2011)
27. What stands for RUBISCO? (S-2011)
28. Define Photosynthesis along with equation. (S-2011)

29. Differentiate between Lactic Acid and Alcoholic Fermentation. (S-2011)
30. Name the process which acts as energy-capturing and energy releasing. (A-2012)
31. What are Accessory Pigments? State their role. (A-2012)
32. Differentiate between Chlorophyll "a" and Chlorophyll "b" by writing molecular formulae of both (A-2012)
33. Differentiate between Absorption Spectrum and Action Spectrum. (A-2013-New)
34. What is the role of Accessory Pigments in Light Absorption? (A-2013-New)
35. What is an Aerobic Respiration? (A-2013-Old)
36. What is ATP? Sketch its formula. (A-2013-Old)

Answers

1. **Products of Light Reactions: -**
The Products of Light Reactions are O₂, ATP and NADPH+H⁺.
2. **Chemiosmosis: -**
It is a biochemical process in which energy from electrons powers the movement of protons across the membrane, a process that leads to ATP formation.
3. **Compensation Point: -**
It is the short moment, usually at dawn and dusk, when:
a. Rates of photosynthesis and respiration are equal.
b. O₂ released from photosynthesis is just the amount required for cellular respiration.
c. CO₂ released by respiration just equals the quantity required by photosynthesizing cells and hence:
d. No net gas exchange occurs between leaves and the environment.
4. **Comperison of Aerobic and Anaerobic Respiration:**

| Aerobic Respiration | Anaerobic Respiration |
|---|---|
| 1. It is the type of respiration in which oxygen is the final electron acceptor. | 1. It is the type respiration which does not not require oxygen as its final electron acceptor. |
| 2. Glucose is completely oxidized. | 2. Glucose is incompletely oxidized. |
| 3. 36 ATP molecules per glucose molecule are produced and the energy released from these is equivalent to 363 kcal. | 3. Two ATP molecules per glucose molecule are produced and the energy released from these is equivalent to 14.6 kcal. |
| 4. End products are CO ₂ and H ₂ O. | 4. End products are CO ₂ and Alcohol or Lactic acid. |

5. **A) Preparatory Phase: -**
Preparatory Phase of Glycylisis is the phase in which break down of glucose occurs
and energy is expended.

Or

and During Preparatory Phase of Glycolysis phosphates are added from ATP ultimately the 6-carbon sugar is split into two 3-carbon compounds.

B) Oxidative Phase: -
 Oxidative Phase of Glycolysis is the phase in which high energy phosphate bonds are formed and energy is stored. Or
 During the Oxidative Phase of Glycolysis NAD^+ accepts electrons and hydrogen to form NADH and ATP is formed.

6. End Product of Anaerobic Respiration in Human:
 The End Product of Anaerobic Respiration in Human is Lactic Acid.

7. Location of Occurrence of TCA Cycle: -
 The reactions of TCA cycle occurs

8. Compensation Point: -
 See Multan Board Answer No: 3

9. Action Spectrum: -
 It is a graph of effectiveness of light at specific wavelengths in promoting a light-requiring reaction. Or
 A graph showing relative effectiveness of different wavelengths (colors) of light in deriving photosynthesis is called Action Spectrum of Photosynthesis.

10. Formula of Chlorophyll "a": -
 The formula of Chlorophyll "a" is $\text{C}_{55}\text{H}_{72}\text{O}_5\text{N}_4\text{Mg}$.

11. Chemiosmosis: -
 Chemiosmosis can be summarized as:
 a) Electrons give up their energy as they move through a series of electron-transport reactions.
 b) Energy from the electron transport reactions is used to pump protons (H^+) across a membrane.
 c) When protons move back through special proteins in the membrane, enzymes capture the energy and use it to synthesize ATP from ADP and P_i .

12. Absorption Spectrum: -
 It is a graph of the amount of light at specific wavelengths as light passes through specific pigments. Or
 It is the region of the spectrum of electromagnetic energy (usually visible light) that is absorbed by a particular molecule or atom and can be shown by plotting the graph.

Or
 The amount of light absorbed at each wavelength is plotted on a graph and the result is a record of the pigment Absorption Spectrum.

13. Molecular Formula of Chlorophyll "a": -
 See Multan Board Answer No: 10

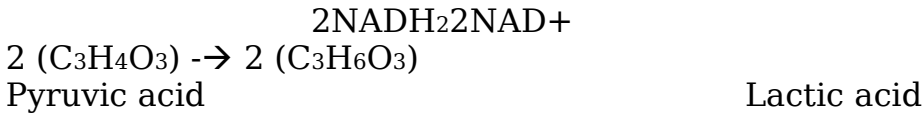
14. A) Lactic Acid Fermentation:
 Lactic Acid Fermentation is an enzyme controlled reaction in which NADH

reduces pyruvate (produced by glycolysis) to lactate or lactic acid.

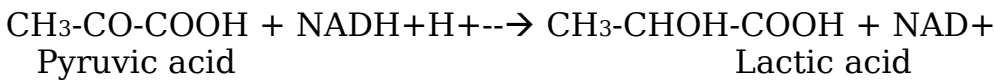
Or

It is a form of anaerobic respiration in the muscle cells of humans and other animals during extreme physical activities in which each pyruvic acid molecule is converted into lactic acid in the absence of oxygen gas.

B) Reaction of Lactic Acid Fermentation:



Or



15. Differences between Chlorophyll “a” and “b”:

| Chlorophyll a | Chlorophyll b |
|--|---|
| 1. It has methyl group (CH ₃) at first pyrrol ring. | 1. It has carbonyl group (CHO) at first pyrrol ring. |
| 2. It is blue green. | 2. It is yellow green. |
| 3. Its structural formula is C ₅₅ H ₇₂ C ₅ N ₄ Mg. | 3. Its structural formula is C ₅₅ H ₇₀ O ₆ N ₄ Mg |

16. Chemiosmosis: -
See Multan Board Answer No: 2

17. Cytochromes: -
Cytochromes are iron -containing protein pigments that serve as electron carriers in electron transport chains of photosynthesis and cellular respiration. Or
Cytochromes are iron containing heme proteins of an electron transport system.

18. Compensation Point: -
See Multan Board Answer No: 3

19. Chemiosmosis: -
See Multan Board Answer No: 2

20. Differences between Absorption Spectrum and Action Spectrum:

| Action spectrum | Absorption spectrum |
|--|--|
| 1. It is the graph showing rate of photosynthesis at each wavelength that is plotted by estimating relative CO ₂ consumption or oxygen release during photosynthesis. | 1. It is the graph showing wave lengths of light absorbed by a pigment. |
| 2. It does not parallel the absorption spectrum of chlorophyll exactly. | 2. The sum of the absorption spectra corresponds to the action spectrum of photosynthesis. |

| | |
|---|---|
| It is more than absorption of different wave lengths due to presence of accessory pigments. | 3. Peaks of wave lengths absorbed are narrower. |
| 3 Peaks are broader. | 4. Valley is deep. |
| 4. Valley is not deep. | |

21. Photolysis: -
 The splitting of water during photosynthesis is known as Photolysis. Or
 It is the photochemical splitting of water in the light-dependent reactions of photosynthesis, catalyzed by a specific enzyme.

22. Photsynthesis with Equation: -
 It is the process in which energy poor organic compounds of carbon and hydrogen (i.e. CO₂ and H₂O) and reduced to energy rich carbohydrates (i.e.Glucose) using the light energy that is absorbed and converted into chemical energy by chlorophyll and other photosynthetic pigments. It can be summarized as:

$$6\text{CO}_2 + 12\text{H}_2\text{O} + \text{light} + \text{chlorophyll} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6 \text{H}_2\text{O}$$
 Or

The process in which autotrophs capture the energy of sunlight by chlorophyll and use this energy for the production of NADPH and ATP. The reducing power of NADPH and chemical energy of ATP are utilized for the conversion of atmospheric CO₂ to Carbohydrate.

$$6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$$
 Or

It is a biological process that captures light energy and transforms it into the chemical energy of organic molecules (e.g.carbohydrates) which are manufactured from carbon dioxide and water.

$$6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$$

23. Calvin Benson Cycle known as C-3 Pathway: -
 Calvin Benson Cycle is known as C-3 Pathway because the first product of initial carbon fixation is a three-carbon compound. Or
 Calvin Benson Cycle is known as C-3 Pathway because in this cycle CO₂ binds to Riboluse 1-3 Bisphosphate (RuBP) to form two three-carbon phosphoglycerate or phosphoglyceric acid (PGA) molecules.

24. Difference between Absorption and Action Spectrum: -
 See Multan Board Answer No: 20

25. A) Cyclic Phosphorylation: -
 It is cyclic flow of electrons through photsystem I in which ATP is formed by chemiosmosis but no photolysis of water occurs and NADPH and O₂ are not produced. Or

It is a process in which electrons produced by photolysis and transferred from water to Ferredoxin but rather than being transferred to NADP+ as in Non-Cyclic Phosphorylation, they are passed back to cytochrome complex to complete the cycle.

It involves only Photosystem I and produces ATP but does not produce NADPH and O₂.

B) Cause of its Occurrence: -
 The cause of its occurrence is that the Dark Reaction requires more ATP than NADPH molecules.

26. Bioenergetics: -
 Bioenergetics is the study of flow and transformation of energy that occur in living organisms.

Or
 Capturing and conservation of energy from one form to another in living system and utilization in metabolic activities is called Bioenergetics.

Or
 Bioenergetics is the quantitative study of energy relationships and energy conversion in biological systems.

27. RUBISCO stands for: -
 RUBISCO stands for Ribulose Bisphosphate Corboxylase/Oxygenase.

28. Photosynthesis with Equation: -
 See Multan Board Answer No: 22

29. Differences between Lactic Acid and Alcoholic Fermentation:

| Lactic Acid Fermentation | Alcoholic Fermentation |
|--|---|
| 1. It occurs in muscle cells of humans and other animals during extreme physical activities. | 1. It takes place in primitive cells and some eukaryotic cells such as yeast. |
| 2. It occurs in one step in which Pyruvic Acid is reduced by NADH ₂ to Lactic Acid. | 2. It occurs in two steps. In the first step pyruvic acid is decarboxylated to produce Acetaldehyde. In the second step NADH +H+reduces acetaldehyde to Ethyl Alcohol |
| 3. Final product is Lactic Acid. | or Ethanol. 3. Final product is Ethyl Alcohol or Ethanol while CO ₂ and Acetaldehyde are intermediate products. |

30. Process which acts as Energy-capturing and Energy releasing: -
 Photosynthesis and Respiration acts as energy-capturing and energy releasing..

31. A) Accessory Pigments: -
 These are photosynthetic pigments other than chlorophyll that enable an organism to utilize more colors of the visible light spectrum for photosynthesis.

Examples: Carotenoids (yellow, red and orange), Phycoerytherins (red),
Phycocyanin (blue) Or

1. These are the pigments other than chlorophylls which absorb light and transfer to main pigments of chlorophyll.
2. Carotenoids (yellow, red and orange) are accessory pigments which absorb mostly blue and blue green light while reflecting the oranges and yellows.
3. Chlorophyll b pigments are also called accessory pigments because they transfer the light energy to chlorophyll a. The order of energy transfer is:
Carotenoid → Chlorophyll b → chlorophyll a
4. Photosynthetic bacteria and various species of algae have other kinds of accessory pigments not found in plants.

B) Role of Accessory Pigments:

1. They enable the organisms to utilize more colors of the visible light spectrum for photosynthesis.
2. They are also responsible for the brilliant colors of vegetables such as carrots, tomatoes, and peppers.

33. Difference between Absorption Spectrum and Action Spectrum: -
See Multan Board Answer No: 20

34. Role of Accessory Pigments in Light Absorption: -
See Multan Board Answer No: 32 (B)

35. Aerobic Respiration:
Aerobic Respiration is the series of reactions involved in the release of unstable energy (ATP) from food molecules, which requires the participation of oxygen molecules.

Or
It is a biochemical pathway that requires oxygen and converts food such as carbohydrates, to carbon dioxide and water. During this conversion, it releases the chemical-bond energy as ATP molecules. Or
Any biological process that occurs in the presence of gaseous oxygen (O₂).

Or
It is a catabolic process that converts the energy in the chemical bonds of nutrients to chemical energy stored in ATP in the presence of molecular oxygen. Most cells use aerobic respiration to obtain energy from glucose. The overall reaction pathway for the aerobic

respiration of glucose is summarized as follows:

$$C_6H_{12}O_6 + 6O_2 + 6H_2O \rightarrow 6CO_2 + 12H_2O + \text{energy in the chemical bonds of ATP}$$

Or
Aerobic respiration is a catabolic process in which a nutrient molecule such as glucose is broken down to form carbon dioxide and water. It includes redox reactions that result in the transfer of electrons from glucose (which becomes oxidized) to oxygen (which becomes reduced).

| Oxidation |



|____Reduction____|

Or

1. It is the type of respiration in which oxygen is the final electron acceptor.
2. Glucose is completely oxidized.
3. 36 ATP molecules per glucose molecule are produced and the energy released from these is equivalent to 363 kcal.
4. End products are CO_2 and H_2O .

36. A) ATP: -

ATP is a molecule formed from the building blocks of adenine, ribose, and phosphates

which functions as primary energy carrier in the cell. Or

It is an organic compound containing adenine, ribose, and three phosphate groups which

is of prime importance for energy transfers in cells. Or

1. ATP is an abbreviated form of adenosine tri-phosphate.
2. An ATP molecule consists of a molecule of adenine (a nitrogen base), a molecule of ribose (a pentose sugar), and three phosphate groups.
3. The two end phosphate groups are bonded together by high energy bonds and are easily, so they release great amount of energy (i.e 7.3 kcal).
4. ATP can transfer a phosphate group to another molecule, making that molecule

more reactive.

Or

Each ATP molecule is a nucleotide composed of three smaller components. The first

component is a five-carbon sugar, which serves as the backbone to which other sub-

units are attached. The second component is adenine, a two carbon-nitrogen ring. The

third component is a triphosphate group (a chain of three phosphates).

B) Structural Formula of ATP: -

Bahawalpur Board

Questions

1. What are Carotenoids? (A-2007)
2. What is the Importance of Adenosine Triphosphate (ATP)? (A-2007)
3. What are the End Products of Light Reactions? Give their role. (A-2008)
4. Compare and contrast the Action Spectrum and Absorption Spectrum. (A-2008)
5. What is Bioenergetics? Explain briefly. (A-2008)
6. What are Accessory Pigments? (A-2009)
7. Define Aerobic and Anaerobic Respiration. (A-2009)
8. What is Compensation Point? (A-2009)
9. Enlist four stages of Cellular Respiration. Where do they occur? (A-2011)

10. Why Photosynthesis is called Redox Process? Illustrate with equation. (A-2011)
11. Why do plants appear green? (A-2012)
12. Define Bioenergetics. (A-2012)
13. What are Thylakoids? (A-2012)
14. Define Stroma. (A-2012)
15. Define Non-Cyclic Phosphorylation. (A-2012)
16. What is Absorption Spectrum? (A-2012)
17. Differentiate between Light Dependent and Light Independent Reactions. (A-2013)
18. Write down the equation of Alcoholic Fermentation in Anaerobic Respiration. (A-2013)

Answers

1. **Carotenoids: -**

Carotenoids (yellow, red and orange) are accessory pigments which absorb mostly blue and blue green light while reflecting the oranges and yellows. They broaden the spectrum of light that provides energy for photosynthesis.

2. **Importance of ATP: -**

1. It is the common energy currency of cell that on demand provides the energy to the cell.
2. It acts a mediator, capable of receiving energy from one reaction and transfers this energy to derive another reaction.
3. ATP plays role in several endergonic reactions such as synthesis of proteins, lipids, carbohydrates, active transport etc.
4. In exergonic reactions like anaerobic glycolysis and oxidative phosphorylation, it also plays its role as coenzyme.

3. **A) The End Products of Light Reactions:**

The End Products of Light Reactions are NADPH and ATP.

B) Role of End Products: -

The reducing power of NADPH and chemical energy of ATP are utilized for the conversion of atmospheric CO₂ to Carbohydrate.

4. **Comparison and Contrast of the Action Spectrum and Absorption Spectrum:**

See Multan Board Answer No: 20

5. **A) Bioenergetics:**

Bioenergetics is the quantitative study of energy relationships and energy conversion in biological systems.

B) Explanation:

All life on this planet is powered directly or indirectly by solar energy. But no organism can make direct use of sun light for metabolism. However plant cells with the help of chloroplasts trap light energy coming from the sun and convert it into energy rich compounds that are available as a source of energy for their metabolism. Other

organisms which do not have the ability to trap the light energy of sun, obtain their energy by eating plants or by eating organisms that eat plants. Capturing and conversion of this energy from one form to another in the living system and its utilization in metabolic activities is called Bioenergetics.

6. Accessory Pigments: -

These are photosynthetic pigments other than chlorophyll that enable an organism to utilize more colors of the visible light spectrum for photosynthesis.
Examples: Carotenoids (yellow, red and orange), Phycoerytherins (red), Phycocyanin (blue)

7. A) Aerobic Respiration: -

See Multan Board Answer No: 35

Examples: Human and all other eukaryotes

B) Anaerobic Respiration:

It is a biochemical pathway that does not require oxygen for the production of ATP and does not use O₂ as its ultimate hydrogen ion acceptor.
Examples: -Yeast, some bacteria etc

8. Compensation Point: -

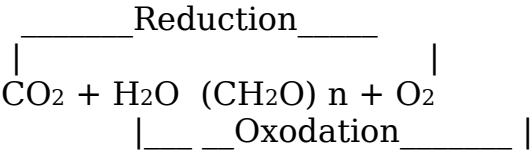
See Multan Board Answer No: 3

9. Four stages of Cellular Respiration and their Occurrence:

| Stages of Cellular Respiration | | Occurrence |
|---------------------------------------|--|--|
| 1. | Glycolysis | Cytosol of Cytoplasm |
| 2. | Pyruvic Acid Oxidation | Fluid between the membranes of Mitochondrion |
| 3. | Krebs Cycle | Fluid between the membranes of Mitochondrion |
| 4. | Respiratory Chain or Electron Transport Chain or ETC | Inner Mitochondrial Membrane |

10. Photosynthesis called Redox Process Illustration with Equation: -

Photosynthesis is called Redox Process because in this process CO₂ is reduced and water is oxidized.
 This is illustrated in the following equation.



11. Plants appear Green: -

Among several photosynthetic pigments in the plants the two most common types are chlorophyll a and chlorophyll b. Both absorb strongly in the red and blue portions of the electromagnetic spectrum, although in slightly different portions of the spectrum. These pigments reflect green light. Other pigments present in the plants are called accessory

pigments which reflect yellow, orange and other colors of light. But presence of these accessory pigments is generally masked by the presence of chlorophylls. That is why plants appear green. Or Chlorophylls absorb mainly violet blue and orange red wave lengths. Green, yellow and indigo wavelengths are least absorbed by chlorophylls and are transmitted or reflected, the yellows are often masked by darker green color. That is why plants appear green unless masked by other pigments as in autumn leaves.

12. Bioenergetics: -

See Multan Board Answer No: 26

13. Thylakoids: -

Thylakoids are thin flattened membranous sacs in the stroma of chloroplast which contain accessory pigments and electron transport molecules. The outer surface of thylakoid is in contact to stroma and its inner surface encloses intra-thylakoid space or thylakoid lumen. Or These are flat disks found in the chloroplast of plants cells that are the site of the light capturing events and light-dependent reactions of photosynthesis. Or It is an interconnected system of flattened sac like membranous structures inside the chloroplasts.

14. Stroma: -

It is a fluid matrix or interior of the chloroplast in which thylakoids and grana are suspended. Or It is the region within a chloroplast that has no chlorophyll. Or It is a fluid space of the chloroplast enclosed by the chloroplast inner membrane and surrounding the thylakoids. It is the site of the Reactions of the Calvin Cycle.

15. Non-Cyclic Phosphorylation: -

In photosynthesis, Non-Cyclic Phosphorylation is the linear flow of electrons produced by photolysis of water through Photosystem I and II results in the formation of ATP (by chemiosmosis), NADPH and O₂. Or

1. It is linear flow of electron from water to NADP⁺.
2. It involves both Photosystems I and II.
3. It generates ATP, NADPH⁺ and O₂.
4. It is the process in which electrons pass from water to a terminal acceptor and never come back to an initial source.

16. Absorption Spectrum: -

It is a graph of the amount of light at specific wavelengths that is absorbed as light passes through a specific pigment. Each type of molecule has a characteristic absorption spectrum. Or Spectrum produced when atoms absorb specific wavelengths of incoming light as they

become excited from lower to higher energy level is called Absorption Spectrum.

Or

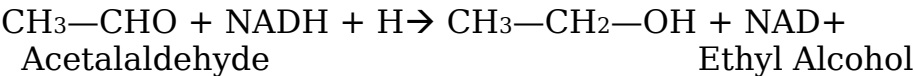
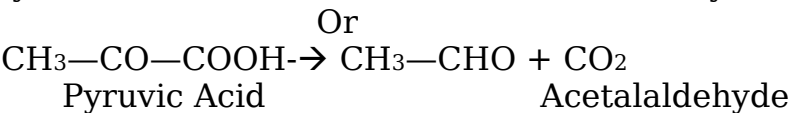
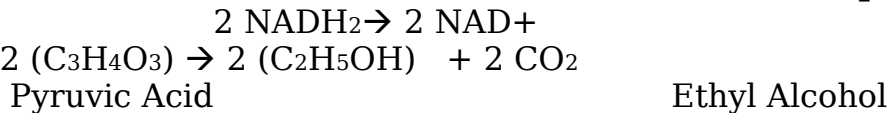
The amount of light absorbed at each wavelength is plotted on a graph and the result is a

record of the pigment's Absorption Spectrum.

17. Differences between Light Dependent and Light Independent Reactions: -

| Light Dependent Reactions | Light Independent Reactions |
|---|--|
| 1. They take place in the thylakoid membranes inside the chloroplast (grana of chloroplast). | 1. They take place within the stroma of chloroplast. |
| 2. The materials needed for light dependent reactions are excited electrons, water, a number of electron carrier molecules, and NADP+. | 2. The materials needed for the light independent reactions are ATP, NADPH, CO ₂ , and a 5-carbon starter molecule called ribulose. |
| 3. The products are O ₂ , NADPH and ATP. | 3. The products are glyceraldehydes-3-phosphate, NADP+, ADP, P and ribulose. |
| 4. The activities of the light-dependent reactions can be summarized as follows: Excited electrons + H ₂ O + ADP + NADP+ → ATP + NADPH + O ₂ | 4. The activities of light-independent reactions can be summarized as follows: ATP + NADPH + ribulose + CO ₂ → ADP + NADP+ + complex organic molecule + ribulose |

18. Equation of Alcoholic Fermentation in Anaerobic Respiration: -



Dera Ghazi Khan Board

Questions

- 1. What is Compensation Point? Describe briefly. (A-2008)
- 2. Compare Chlorophyll "a" and Chlorophyll "b" (A-2008)
- 3. What are Photo Systems? Differentiate between PS-I and PS-II. (A-2008)
- 4. Define Bioenergetics. On what principles biological energy transformation occurs? (A-2009)
- 5. What is Calvin Cycle? Give the names of its three phases. (A-2009)
- 6. What is Compensation Point? (A-2009)

- 7. What are the roles of Antenna Complex and Reaction Centre of Photo System in Thylakoid membrane? (A-2010)
- 8. What are the stages of cellular Respiration? (A-2010)
- 9. Name the phases of Calvin Cycle. (A-2010)
- 10. How much energy is released by the break down of ATP molecule? (A-2010)
- 11. What is Compensation Point? (A-2011)
- 12. Write the Molecular Formulae for Chlorophyll a and Chlorophyll b. (A-2011)
- 13. What do you know about Action Spectrum? (A-2013)
- 14. What is Z scheme? Why is it called so? (A-2013)

Answers

- 1. **Compensation Point:** -
See Multan Board Answer No: 3
- 2. **Compare Chlorophyll "a" and Chlorophyll "b":**
See Multan Board Answer No: 15
- 3. **A) Photosystems:**
A Photosystem consists of a pigment complex (molecules of chlorophyll a and b and carotenoids) and electron acceptor molecules for efficient absorption and utilization of solar energy in thylakoid membranes. Or
A Photosystem is a cluster or functional unit of chlorophylls, accessory pigments and associated proteins within the thylakoid membranes.
There are two Photosystems i.e. Photosystem I or PSI or P₇₀₀ and Photosystem II or PSII or P₆₈₀.

B) **Difference between PSI and PSII:**

| PS I | PS II |
|---|---|
| 1. It is located mainly in non-stacked thylakoids. | 1. It is present in stacked membranes of grana. |
| 2. It is found in plants, algae, cyanobacteria and photosynthetic bacteria. | 2. It is absent in photosynthetic bacteria. |
| 3. It consists of primary acceptor, chlorophyll a and accessory pigments. | 3. It contains chlorophyll a, b plus accessory pigments. |
| 4. It strongly absorbs light of about 700 nm hence it is called P ₇₀₀ where P stands simply for pigment. | 4. It strongly absorbs light of about 680 nm hence is called P ₆₈₀ . |

- 4. **A) Bioenergetics:** -
Bioenergetics is the study of flow and transformation of energy that occur in living organisms.
B) Principles for Energy Transformation:
Principles for Energy Transformation are the Laws of Thermodynamics.
- 5. **A) Calvin Cycle:** -

Cyclic series of reactions in the chloroplast stroma, catalyzed by respective enzymes, by which the carbon is fixed and reduced resulting in the synthesis of sugar during the dark or light independent reactions of photosynthesis is called Calvin Cycle.

Or

The dark reactions of C₃ pathways in which CO₂ binds to ribulose 1, 5 bishosphate to form two 3-carbon phosphoglycerate or phosphoglyceric acid (PGA) molecules

Or

Calvin Cycle can be summarized as:

1. The energy of ATP (generated in Light Reaction) is used to combine to 5-C starter molecule RUBP to form an unstable 6-C compound that immediately divides into two 3-C molecules 3-phosphoglycerate or 3-phosphoglyceraldehyde (PGA).
2. NADPH (generated in Light Reaction) reduces PGA molecules into G3P (Glyceraldehyde 3-phosphate) molecules, some of which leave the cycle to be used by the plant for making glucose.
3. Some molecules of G3P are rearranged to regenerate three molecules of 5-C RUBP.

B) Three Phases of Calvin Cycle:

Three phases of Calvin Cycle are:

1. Carbon Fixation
2. Reduction
3. Regeneration of CO₂ acceptor (RUBP)

6. Compensation Point: -

See Multan Board Answer No: 3

7. Roles of Antenna Complex & Reaction Centre of Photo System in Thylakoid

Membrane:

The role of Antenna Complex is to capture photons of light energy and transfer to pair of chlorophyll a in the reaction centre. while Reaction Centre is the site where light driven chemical reactions of photosynthesis occur.

8. Stages of Cellular Respiration:-

1. Glycolysis
2. Pyruvic Acid Oxidation
3. Krebs Cycle or Citric Acid Cycle
4. Respiratory Chain or Electron Transport Chain or ETC

9. The Phases of Calvin Cycle:

1. Carbon Fixation
2. Reduction
3. Regeneration of CO₂ acceptor (RUBP)

10. Energy released by the break down of ATP molecule: -

7.3 Kcal of energy is released by the break down of ATP molecule.

11. Compensation Point:

See Multan Board Answer No: 3

- 12. Molecular Formulae for Chlorophyll a and Chlorophyll b: -**
The Molecular Formulae for Chlorophyll a and Chlorophyll b are $C_{55}H_{72}O_5N_4Mg$ and $C_{55}H_{70}O_6N_4Mg$ respectively
- 13. Action Spectrum: -**
See Multan Board Answer No: 9
- 14. A) Z scheme:**
The path of electrons through two photosystems during non-cyclic photophosphorylation is known as Z-scheme.
- B) Z scheme is called so: -**
Z-scheme is called so because its shape is just like Z.

Lahore Board Questions

1. Define Chemiosmosis. (A-2006)
2. Define Photosynthesis. (A-2007)
3. What is meant by Bacteriochlorophylls? (A-2007)
4. What is Action Spectrum? (A-2008)
5. What do you know about Rubisco? (A-2008)
6. Define Phtophosphorylation. (A-2008)
7. Point out the role of Miochondria in Respiration. (A-2009)
8. What do you know about Action Spectrum? (A-2009)
9. Name the Processes which act as Energy Capturing and Energy Releasing. (A-2010)
10. What are the main parts of a Chlorophyll Molecule and what is Prophyrin Ring? (A-2010)
11. What are Acessory Pigments? State their Role. (A-2011)
12. What is Rubisc? What is its function? (A-2011)
13. Name the Processes which act as Energy Capturing and Energy Releasing. (A-2011)
14. Write a note on Lactic Acid Fermentation. (A-2012)
15. Write molecular formulae of Chl.a and Chl.b. (A-2012)
16. Differentiate between Photo Phosphorylation and Oxidative Phosphorylation. (A-2012)
17. What is meant by action spectrum? (Group I-A-2013)
18. What is stroma? (Group I-A-2013)
19. Define chemiosmosis. (Group II-A-2013)
20. Differentiate between alcoholic fermentation and lactic acid fermentation. (Group II-A-2013)

Answers

- 1. Chemiosmosis: -**
See Multan Board Answer No: 2
- 2. Photosynthesis: -**
See Multan Board Answer No: 22
- 3. Bacteriochlorophylls: -**
Bacteriochlorophylls are the pigments in bacterial membrane systems that upon excitement by light lose electrons and initiate photosynthetic reactions. They are different from the pigments

found in higher plants and algae.

Example: -Bacteriochlorophylls a and b are found in green sulfur bacteria which do not use water as a source of hydrogen ions in the production of carbohydrate in the dark reaction, instead they use H_2S as a hydrogen ion source and convert the hydrogen sulfide to sulfur. Consequently no oxygen is liberated.

4. Action Spectrum: -

See Multan Board Answer No: 9

5. Rubisco:

It is the common name of ribulose biphosphate carboxylase that catalyzes the fixation of

carbon dioxide in the Calvin Cycle. Or

1. It is an enzyme in the stroma of chloroplasts that speed up the combining of CO_2 /

O_2 with already present 5-C carbohydrate RUBP in the chloroplasts.

2. It is abbreviated form of Ribulose Bi Phosphate Carboxylase / Oxygenase.

3. It usually behaves as RUBP carboxylase but under some environmental conditions

it can behave as RUBP Oxygenase instead of Carboxylase.

4. It is the most abundant protein in the chloroplasts and probably the most abundant

protein on earth.

6. Phtophosphorylation: -

Light dependent synthesis of ATP in photosynthesis is known as Photophosphrylation.

Or

It is the production of ATP in photosynthesis. Or

It refers to a series of changes in which sun light energy absorbed by photosynthetic

pigments lysis water molecules removing pairs of electrons which are passed from one

substance to another and energy released is used to form ATP.

7. Role of Miochondria in Respiration: -

Mitochondria are the organelles that are the sites of aerobic respiration, an oxygen

requiring process that includes most of the reactions that convert the the chemical energy

present in certain foods to ATP.

8. Action Spectrum: -

See Multan Board Answer No: 9

9. Names of the Processes which act as Energy Capturing and Energy Releasing: -

Photosynthesis and Respiration respectively.

10. A) Main parts of Chlorophyll molecule: -

Chlorophyll Molecule has two main parts which are:

a. **Head** It is flat, square, light absorbing hydrophilic part containing porphyrin ring.

b. **Tail** It is long, anchoring, hydrophobic hydrocarbon phytol ($C_{20}H_{39}$).

B) Porphyrin Ring: -

It is made up of four joined smaller pyrrol rings composed of carbon and nitrogen

atoms. An atom of Magnesium is present in the centre of prophyrin ring and is coordinated with the nitrogen of each pyrrole ring.

11. Accessory Pigments and their Role: -
Multan Board Answer No: 31

12. A) Rubisco: -
It is an enzyme in the stroma of chloroplasts that is abbreviated form of Ribulose Biphosphate Carboxylase/Oxygenase
B) Function:
It usually catalyzes the fixation of carbon dioxide into carbohydrate in the Calvin Cycle.

13. Name of the Processes which act as Energy Capturing and Energy Releasing: -
The processes which act as Energy Capturing and Energy Releasing are Photosynthesis and Respiration respectively

14. A Note on Lactic Acid Fermentation: -
See Multan Board Answer No: 14

15. Molecular Formulae of Chl.a and Chl.b: -
See Dera Ghazi Khan Answer No: 12

16. Differences between Photophosphorylation and Oxidative Phosphorylation:

| Photo Phosphorylation | Oxidative Phosphorylation |
|---|--|
| It refers to a series of changes in which sun light energy absorbed by photosynthetic pigments lysis water molecules removing pairs of electrons which are passed from one substance to another and energy released is used to form ATP | It refers to a series of changes in which pairs of electrons are passed from one substance to another and ultimately to oxygen and the energy released during the passage is used to combine ADP molecules with phosphate molecules to form ATP. |

17. Action Spectrum: -
See Multan Board Answer No: 9

18. Stroma: -
See Bahawalpur Board Answer No: 14

19. Chemiosmosis: -
See Multan Board Answer No: 2

20. Differences between Alcoholic Fermentation and Lactic Acid Fermentation: -

See Multan Board Answer No: 29

Gujranwala Board Questions

1. Differentiate between Absorption Spectrum and Action Spectrum. (A-2006)
2. Define Photosynthesis with equation. (A-2007)
3. What is the difference between Action Spectrum and Absorption Spectrum? (A-2007)
4. Define Bioenergetics. (A-2008)
5. What is Stroma? Give its functions. (A-2008)
6. What is Antenna Complex? (A-2008)
7. Differentiate Absorption Spectrum from Action Spectrum (A-2009)
8. What are Photosystems and their types? (A-2009)
9. What is Bioenergetics? (A-2009)
10. Give the Chemical Equation of Alcoholic Fermentation. (A-2010)
11. What is Compensation Point? (A-2010)
12. What is the Net Production of ATP during Glycolysis? (A-2010)
13. Differentiate between Action Spectrum and Absorption Spectrum. (A-2011)
14. What is Spectrophotometer? Write its uses. (A-2011)
15. What is antenna complex? (A-2013)
16. Define photolysis of water. (A-2013)

Answers

1. **Differences between Absorption Spectrum and Action Spectrum: -**
See Multan Board Answer No: 20
2. **Photosynthesis with Equation: -**
See Multan Board Answer No: 22
3. **Differences between Absorption Spectrum and Action Spectrum: -**
See Multan Board Answer No: 20
4. **Bioenergetics: -**
See Multan Board Answer No: 26
5. **A) Stroma:**
It is a fluid matrix or interior of the chloroplast in which thylakoids and grana are suspended.
B) Function:
It is the site where carbon is fixed and reduced resulting in the synthesis of sugar during the dark reactions of photosynthesis. Or
It is the site of the Reactions of the Calvin Cycle.
6. **Antenna Complex: -**
Antenna complex is a net-work of 200 to 2000 pigment molecules of chlorophyll a, b and carotenoid in green plants whose role is to capture photons of light energy and transfer to pair of chlorophyll a in the reaction centre.

7. **Differences between Absorption Spectrum and Action Spectrum:** -
See Multan Board Answer No: 20
8. **A) Photosystem:**
A Photosystem is a cluster or functional unit of chlorophylls, accessory pigments and associated proteins within the thylakoid membranes.
- B) Types of Photosystems:**
There are two Photosystems i.e. Photosystem I and Photosystem II.
- a. **Photosystem I or PSI or P₇₀₀:** -
1. It is located mainly in non-stacked thylakoids.
 2. It is found in plants, algae, cyanobacteria and photosynthetic bacteria.
 3. It consists of primary acceptor, chlorophyll a and accessory pigments.
 4. It absorbs light about 700 nm, hence it is called P₇₀₀ where P stands simply for pigment.
- b. **Photosystem II or PSII or P₆₈₀:**
1. It is present in stacked membranes of grana.
 2. It is absent in photosynthetic bacteria.
 3. It contains chlorophyll a, b plus accessory pigments.
 4. It absorbs only short wave length of red light primarily at 680 nm hence is called P₆₈₀.
9. **Bioenergetics:** -
See Multan Board Answer No: 26
10. **Chemical Equation of Alcoholic Fermentation:** -
See Bahawalpur Board Answer No: 18
11. **Compensation Point:** -
See Multan Board Answer No: 3
12. **Net Production of ATP during Glycolysis:** -
The net production of ATP during Glycolysis is 2 molecules.
13. **Differences between Absorption Spectrum and Action Spectrum:** -
See Multan Board Answer No: 20
14. **A) Spectrophotometer:**
It is an instrument.
- B) Use of Spectrophotometer:** -
It measures the amount of light that passes through the sample and from this it is possible to calculate how much light was absorbed.
Or
It is used to measure relative abilities of different pigments to absorb different wavelengths of light.
15. **Antenna Complex:** -
See Gujranwala Board Answer No: 6
16. **Photolysis of Water:** -
See Faisalabad Board Answer No: 2

Rawalpindi Board

Questions

- 1. Differentiate between Photolysis and Photophosphorylation. (A-2010)
- 2. Give the function of Phytol Tail in Chlorophyll molecule. (A-2010)
- 3. Define Bioenergetics. (A-2010)
- 4. What is Photosynthesis? (A-2010)
- 5. Distinguish between Photosystem I and Photosystem II. (A-2011)
- 6. Give the chemical composition of Alcoholic and Lactic Acid Fermentations. (A-2011)
- 7. Give complete names for the abbreviations NAD and FAD. (A-2011)
- 8. Define Absorption Spectrum and Action Spectrum. (A-2012)
- 9. What is Photosystem? (A-2012)
- 10. Differentiate between Photo Phosphrylation and Oxidative Phosphorylation. (A-2012)
- 11. Define Action Spectrum. (A-2013)
- 12. Define Photosynthesis. (A-2013)

Answers

- 1. **Differences between Photolysis and Photophosphorylation: -**

| Photolysis | Photophosphorylation |
|---|--|
| It is plitting of water by absorbing sun light energy during light dependent reactions of photosynthesis. | It is the formation of ATP by the energy released in photolysis of water during light dependent reactions of photosynthesis. |

- 2. **Function of Phytol Tail in Chlorophyll Molecule:**
The function of Phytol Tail in Chlorophyll Molecule is to embed the molecule in the hydrophobic core of thylakoid membrane.

- 3. **Bioenergetics:**
See Multan Board Answer No: 26

- 4. **Photosynthesis: -**
See Multan Board Answer No: 22

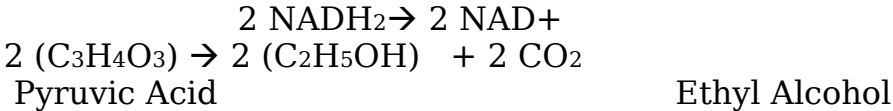
- 5. **Differences between Photo System I and Photo System II:**

| Photo System I | Photo System II |
|---|---|
| 1. It is located mainly in non-stacked thylakoids. | 1. It is present in stacked membranes of grana. |
| 2. It is found in plants, algae, cynobacteria and photosynthetic bacteria. | 2. It is absent in photosynthetic bacteria. |
| 3. It consists of primary acceptor, chlorophyll a and accessory pigments. | 3. It contains chlorophyll a, b plus accessory pigments. |
| 4. It strongly bsorbs light of about 700 nm hence it is called P ₇₀₀ | 4. It strongly absorbs light of about 680 nm hence is called P ₆₈₀ . |

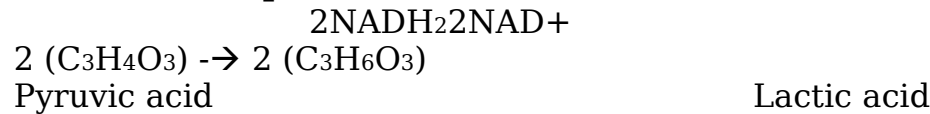
| | |
|------------------------------------|--|
| where P stands simply for pigment. | |
|------------------------------------|--|

6. Chemical Composition of Alcoholic and Lactic Acid Fermentations: -

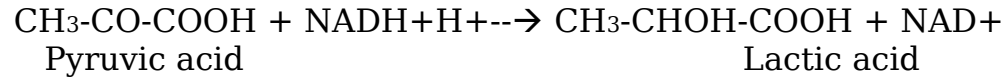
1. Chemical Composition of Alcoholic Fermentation: -



2. Chemical Composition of Lactic Acid Fermentation: -



Or



7. Complete Names for the Abbreviations NAD and FAD: -

1. **NAD** Nicotinamide Adenine Dinucleotide
2. **FAD** Flavin Adenine Dinucleotide

8. A) Absorption Spectrum: -

It is a graph of the amount of light at specific wavelengths that is absorbed as light passes through a specific pigment. Each type of molecule has a characteristic absorption spectrum. Or
The amount of light absorbed at each wavelength is plotted on a graph and the result is a record of the pigment's Absorption Spectrum.

B) Action Spectrum: -

It is a graph of effectiveness of light at specific wavelengths in promoting a light-requiring reaction. Or
A graph showing relative effectiveness of different wavelengths (colors) of light in deriving photosynthesis is called Action Spectrum of Photosynthesis.

9. Photosystem:

A Photosystem is a cluster or functional unit of chlorophylls, accessory pigments and associated proteins within the thylakoid membranes.

10. Differences between Photo Phosphorylation and Oxidative Phosphorylation:

See Lahore Board Answer No: 16

11. Action Spectrum: -

See Rawalpindi Board Answer No: 8 (B)

12. Photosynthesis: -

See Multan Board Answer No: 22

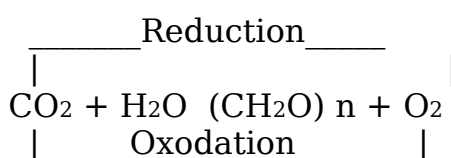
Sargodha Board Questions

1. Define Bioenergetics. (A-2010)
2. What is Compensation Point? (A-2010)
3. Compare Aerobic and Anaerobic Respiration. (A-2010)

4. What are Thylakoids? (A-2011)
5. Where and when Anaerobic Respiration occurs in man and other animals. (A-2011)
6. Define Oxidative Phosphorylation. (A-2011)
7. Differentiate between Absorption Spectrum and Action Spectrum. (A-2012)
8. Define Redox Process. Give example. (A-2012)
9. Differentiate between Photosynthetic and Accessory Pigments. (A-2012)
10. Define chemiosmosis. (A-2013)
11. Describe alcoholic fermentation. (A-2013)

Answers

1. **Bioenergetics:** -
See Multan Board Answer No: 26
2. **Compensation Point:**
See Multan Board Answer No: 3
3. **Comparisom of Aerobic and Anaerobic Respiration:** -
See Multan Board Answer No: 4
4. **Thylakoids:** -
See Bahawalpur Board Answer No: 13
5. **A) Where (Occurrence of Anerobic Respiration in Man):**
In the muscle cells of man and other animals
B) When (Occurrence of Anerobic Respiration in Man):
During extreme and physical activities such as sprinting when oxygen can not be transported to the cells as rapidly as it is needed
6. **Oxidative Phosphorylation:** -
It is a series of steps in which energy is released from electrons as they pass among enzymes, cytochromes and ultimately to oxygen. The energy thus released is used to combine Phosphate ions with ADP molecules to form ATP molecules.
Or
It is the process by which ATP production is associated with electron transport system that uses oxygen as the final acceptor. It occurs in Mitochondria.
7. **Differences between Absorption Spectrum and Action Spectrum:** -
See Multan Board Answer No: 20
8. **A) Redox Process:**
It is reduction oxidation process in which carbon dioxide is reduced and water is oxidized.
It is not a simple, single step process but is a complex one that is completed by a series of simple steps or reactions. It can be summarized by the following equation.



- B) Example:**
Photosynthesis
9. **Differences between Photosynthetic Pigments and Acessory Pigments:**

| Photosynthetic Pigments | Acessory Pigments |
|--|--|
| <ol style="list-style-type: none"> 1. They are usually chlorophyll pigments found in the photosynthetic organisms. 2. They absorb mainly violet blue and orange red wave lengths and are the sites where light driven reactions of photosynthesis occur. | <ol style="list-style-type: none"> 1. These are usually photosynthetic pigments other than chlorophyll. Sometimes chlorophyll b also acts as an accessory pigment. 2. Carotenoids (yellow, red and orange) are the main accessory pigments which absorb mostly blue and blue green light and transfer to main chlorophyll pigments. They themselves are not involved in the reactions of photosynthesis. |

10. Chemiosmosis: -

See Multan Board Answer No: 11

11. Alcoholic Fermentation: -

1. It takes place in primitive cells and some eukaryotic cells such as yeast.
2. It occurs in two steps. In the first step pyruvic acid is decarboxylated to produce Acetaldehyde. In the second step $\text{NADH} + \text{H}^+$ reduces acetaldehyde to Ethyl Alcohol or Ethanol.
3. Final product is Ethyl Alcohol or Ethanol while CO_2 and Acetaldehyde are intermediate products.

Faislabad Board

Questions

1. What is meant by Compensation Point? (A-2007)
2. What is Photolysis? (A-2007)
3. What is Glycolysis? (A-2007)
4. Define Aerobic and Anaerobic Respiration. (A-2008)
5. What is Chemiosmosis? (A-2008)
6. What are Accessory Pigments? (A-2008)
7. What are Cytochromes? (A-2009)
8. What is Compensation Point? (A-2009)
9. What is Compensation Point? When it occurs? (A-2010)
10. What is Stroma? Give its function. (A-2010)
11. Give the molecular formulae for Chlorophyll "a" and "b". (A-2010)
12. What is Calvin-Benson Cycle? (A-2011)
13. Differentiate between Absorption Spectrum and Action Spectrum. (A-2011)
14. Define Compensation Point. (A-2011)
15. Name the processes which act as energy capturing and energy releasing. (A-2012)
16. What are Accessory Pigments? State their role. (A-2012)
17. What is Rubisco? What is its function? (A-2012)
18. Define Glycolysis. Where it takes place? (A-2013)
19. What kinds of chlorophylls are found in photosynthetic plants and algae? (A-2013)

Answers

1. Compensation Point: -

See Multan Board Answer No: 3

2. Photolysis: -

The splitting of water during photosynthesis is known as Photolysis. Or

It is splitting of water by absorbing sun light energy during light dependent reactions of

photosynthesis.

Or

Photolysis of water is summarized as:

Chlorophylls in the reaction centre of Photo System II absorb sun light and split a water

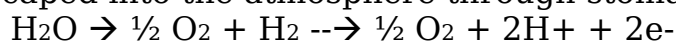
molecule into:

i. Two hydrogen atoms which further split into two hydrogen ions (H⁺) and two

electrons (2 e⁻) that are transferred along with H⁺ to CO₂ reducing it to sugar.

ii. an oxygen atom which immediately combines with another oxygen atom to form O₂

that are escaped into the atmosphere through stomata.



3. Glycolysis: -

Glycolysis is the break down of Glucose, a 6-C compound through a series of enzyme

controlled reactions into two molecules of Pyruvic acid, a 3-C compound. Or

It is a metabolic conversion of glucose into pyruvate, accompanied by the production of

ATP.

Or

Glycolysis is an enzyme catalyzed process that yields two molecules of pyruvate with a

net of two molecules of ATP. Or

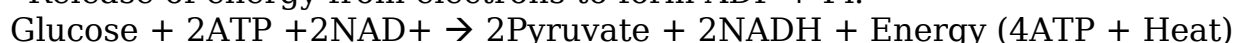
Glycolysis is a series of enzyme controlled reactions (i.e. biochemical pathway) taking place

in the cytoplasm of cells in which 6-C glucose molecule is oxidized which results in:

a. Production of two molecules of 3-C Pyruvate or Pyruvic acid.

b. Release of electrons that are picked up NAD⁺ forming NADH.

c. Release of energy from electrons to form ADP + Pi.



4. Aerobic and Anaerobic Respiration:

See Bahawalpur Board Answer No: 7

5. Chemiosmosis: -

See Multan Board Answer No: 11

6. Accessory Pigments:

See Multan Board Answer No: 31

7. Cytochromes:

See Multan Board Answer No: 17

8. Compensation Point:

See Multan Board Answer No: 3

9. A) Compensation Point:

See Multan Board Answer No: 3

B) Occurrence: -

It usually occurs at dawn and dusk.

10. **Stroma and its Function:** -
See Gujranwala Board Answer No: 5
11. **Molecular formulae for Chlorophyll "a" and "b":** -
See Dera Ghazi Khan Board Answer No: 12
12. **Calvin Besin Cycle:** -
See Dera Ghazi Khan Board Answer No: 5
13. **Differences between Absorption Spectrum and Action Spectrum:** -
See Multan Board Answer No: 20
14. **Compensation Point:** -
See Multan Board Answer No: 3
15. **Names of the Processes which act as Energy Capturing and Energy Releasing:**
Photosynthesis and Respiration are the processes which act as energy capturing and energy releasing respectively.
16. **Acesssory Pigments and their Role:** -
See Multan Board Answer No: 31
17. **Rubisco and its Function:** -
See Lahore Board Answer No: 12
18. **Glycolysis and its location:** -
See Faislabad Board Answer No: 3
It is found in the cytoplasm.
19. **Kinds of Chlorophylls are found in Photosynthetic Plants and Algae:**
Chlorophyl a, b and carotenoids are found in photosynthetic plants and algae.

Chapter No: 12 3 SQs
Multan Board

Questions

1. Name diseases caused by *Clostridium butulinum* and *Salmonella*. (A-2007)
2. Write a brief note on Miccorrhizae. (A-2007)
3. What are the functions of Secretin and Gastrin? (S-2007)
4. What is the role of Gastrin? (Model Paper-2006-08)
5. How is food swallowed by you? (Model Paper-2006-08)
6. Name the parts of three main divisions of the Digestive System of Cockroach. (Model Paper-2006-08)
7. Differentiate between Appendix and Appendicitis. (Model Paper-2006-08)
8. What are Fluid Feeders? Give two examples. (A-2008)
9. What is the biological name Pitcher Plant? (A-2008)
10. What are Omnivores? (S-2008)
11. What is Assimilation? (S-2008)
12. Differentiate between Ingestion and Egestion. (A-2009)
13. Define Macrophagous feeding with examples. (A-2009)
14. What is the affect of deficiency of Magnesium on Plants? (S-2009)

15. What is Heart Burn or Pyrosis? (S-2009)
16. Name two groups of Herbivorous Mammals. (A-2010)
17. How Pepsinogen is converted into Pepsin? (A-2010)
18. How does Jaundice develop? (A-2010)
19. What are Detritivore and Omnivore Animals? (S-2010)
20. What are Symptoms of Dyspepsia? (S-2010)
21. What is Pyrosis? Give its causes. (S-2010)
22. What is Jaundice? (A-2011)
23. What are Omnivores? Give two examples. (S-2011)
24. What is Chyme? (S-2011)
25. Give the names of four digestive juices in man(S-2011)
26. Differentiate between Absorption and Assimilation. (A-2012)
27. What are Ungulates? Give their two examples. (A-2012)
28. Define Botulism. Name the bacterium which causes Botulism. (A-2012)
29. Define Nutrition. (A-2013-New)
30. Differentiate between Absorption and Assimilation. (A-2013-New)
31. What is Heart Burn or Pyrosis? Also describe its cause. (A-2013-New)
32. What are Detritivores? (A-2013-Old)
33. What is Jaundice? (A-2013-Old)
34. What is Pyrosis? (A-2013-Old)

Answers

1. **Names of Diseases caused by *Clostridium butulinum* and *Salmonella*:**
Botulism (severe form of food poisoning) and common food poisoning are caused by
Clostridium butulinum and *Salmonella*.
2. **A brief note on Miccorrhizae:**
The word mycorrhiza is used in two related meanings.
 - a) First, mycorrhiza (Gk. mykes = fungus, rhiza = root) is a fungus which usually grows
inside a plant's root hair cells—the cells through which plants absorb nutrients. The
hyphae of mycorrhiza grow out of the root hair cells and greatly increase absorptive
area.
 - b) Second, mycorrhiza is a mutualistic or symbiotic association between
fungal
hyphae and roots of vascular plants.
3. **A) Functions of Secretin: -**
 1. It stimulates the liver to secrete bile.
 2. It stimulates the pancreas to produce the pancreatic juice.
 3. It inhibits gastric secretion.**B) Function of Gastrin:**
It activates the gastric glands to produce gastric juice.
4. **Role of Gastrin:**
The role of Gastrin is to stimulate gastric glands to produce more gastric juice.
5. **Swallowing of Food:**
Following steps take place in swallowing the food.
 1. The tongue moves upwards and backwards against the roof of the mouth cavity
forcing the bolus to the back of the mouth cavity.
 2. The backward movement of the tongue elevates the soft palate.
Elevation of the soft palate:
 - a. Seals off (closes) nasal cavity and prevents food from entering it.

- an
- b. Exerts pressure against the back wall of the pharynx that triggers automatic involuntary response which includes:
 - i. Contraction of a ring of muscle of glottis closing it partly
 - ii. Rise of Larynx
 - iii. Taking of Epiglottis in the elevated position keeping food out of the respiratory tract, directing it instead into the oesophagus
3. The food is forced down the oesophagus by peristalsis.

6. Three main divisions and their parts of the Digestive System of Cockroach:

| Main Divisions | Parts of Divisions |
|---------------------------|--|
| 1. Foregut or Stomodaeum | Mouth with mouth parts Mouth cavity with a pair of salivary glands Pharynx Crop Gizzards |
| 2. Midgut or Mesenteron | Stomach with eight hepatic caecae |
| 3. Hindgut or Proctodaeum | Ileum or Small intestine Large intestine or Colon Rectum with anus |

- 7. Difference between Appendix and Appendicitis: -**
 Appendix is a finger like process or blind tube of about 18 cm which arises from lower portion of Caecum, the first part of large intestine while Appendicitis is the inflammation of Appendix due to entrapping and then putrefication of food in the Appendix.

- 8. A) Filter Feeders: -**
 Fluid feeders are the animals which feed on fluid. Or
 The animals which ingest liquid food are called fluid feeders.
- B) Two Examples:**
- a. Aphids are fluid feeders which suck phloem juice by means of their delicate long stylets.
 - b. Female mosquito is also a fluid feeder which sucks blood from the capillaries of skin by means of labrum, a kind of its mouth part.

- 9. Biological Name Pitcher Plant: -**
 The biological name of Pitcher Plant is *Sarracenia purpurea*.

- 10. Omnivores:**
 The animals which are carnivore at some times and herbivores at others, they are called Omnivores. Or
 Omnivores are the animals which feed on both plants and animals.
Examples: -Crows, Fox, Rats, Bears, Pigs, Man etc.

- 11. Assimilation: -**
 It is the utilization of the products of digestion for production of energy or synthesis of cellular material. Or
 The utilization of the absorbed food molecules by the body to provide energy or materials

for tissue building.

Or

12. Difference between Ingestion and Egestion: -

Ingestion is the process of taking food into the body through eating while egestion is the

elimination of the undigested food from the body. Or

Taking in of complex food is called Ingestion while elimination of undigested matter by an animal is called Egestion.

13. Macrophagous Feeding with Examples: -

The process by which animal feeds on large particles is called Macrophagous Feeding.

Or

It is the type of feeding in which animal takes in food in the form of a large pieces.

Examples: Hydra, Helix, Spotted dog fish etc.

14. The affects of deficiency of Magnesium on Plants: -

1. Chlorosis occurs.
2. Leaves, sometimes, develop dead spots.
3. Severly affected leaves may wither and shed.

15. Heart Burn or Pyrosis: -

Heart Burn or Pyrosis is a painful sensation in a chest cavity usually associated with the

back flush of acidic chyme into the oesophagus.

16. Names of Two groups of Herbivorous Mammals:

Two groups of Herbivorous Mammals are **Rodents** and **Ungulates**.

17. Conversion of Pepsinogen into Pepsin: -

When bolous enters the stomach it stimulates the gastric pits to secrete HCl (as H⁺ and

Cl⁻) and Pepsinogen. The H⁺ ions cause Pepsinogen to be converted into the active

enzyme Pepsin. Or

When pepsinogen comes in contact with the acidic gastric juice in the stomach, it is

converted to Pepsin. Or

Pepsinogen is a weak proteases (protein digesting enzyme) that requires a very low pH to

be active. This low pH is provided by the HCl. Activated Pepsinogen molecules then

cleave one another at specific sites producing a much mor active protease Pepsin.

18. Development of Jaundice: -

Jaundice develops due to:

a. Obstruction of bile ducts preventing bile pigments from leaving digestive tract and

hence accumulation of these pigments in the blood.

b. Increased destruction of red blood cells with rapid release of bilirubin into the

blood.

19. A) Detritivore Animals: -

These are the animals which use detritus (fragments of decomposing material)

as food. Or

The animals which feed on organic debris are called Detritivores
Examples: Earthworm, Ants, Some beetles etc.

- B) Omnivore Animals:**
Omnivores are the animals that eat meat as well as vegetable matter.
Examples: -Crows, Fox, Rats, Bears, Pigs, Man etc.

- 20. Symptoms of Dyspepsia: -**
Symptoms of Dyspepsia are heart burn, flatulence, nausea and vomiting with or without abdominal pain which may occur irregularly and in different pattern from time to time.

- 21. A) Pyrosis:**
Pyrosis is a painful sensation in a chest cavity usually associated with the back flush of acidic chyme into the oesophagus.
B) Causes:
Its causes are overeating, fatty food, lying down immediately after a meal, consuming too much alcohol, caffeine or smoking.

- 22. Jaundice: -**
The word jaundice means a yellow tint to the body tissues including yellowness of the white of eyes, skin as well as deep tissues.

- 23. Omnivores and their examples:**
See Multan Board Answer No: 10

- 24. Chyme: -**
The term chyme is applied to semi-solid food in stomach

- 25. Names of Four Digestive Juices in Man:**
The names of four digestive juices in man are:
1. Saliva
2. Gastric juice
3. Intestinal juice
4. Pancreatic juice

- 26. Differences between Absorption and Assimilation:**

| Absorption | Assimilation |
|---|---|
| 1. It is the process in which digested food molecules from the digestive region are diffused into body cells either directly or through a transport medium (blood and lymph). | 1. It is utilization of digested products either for the production of energy or cellular material. |
| 2. It takes place in the villi of small intestine in humans. | 2. It takes place in the cells. |

- 27. Ungulates with Two Examples: -**

- 28. A) Botulism: -**

- fatigue,
not
- Botulism is the severe form of food poisoning which is characterized by dizziness, double vision, nausea, vomiting, diarrhea, abdominal pain and if treated may lead to cardiac and respiratory paralysis.
- B) Cause:**
Toxins produced by *Clostridium botulinum*, a bacterium.
- 29. Nutrition: -**
See Lahore Board Answer No: 2
- 30. Difference between Absorption and Assimilation: -**
See Multan Board Answer No: 26
- 31. A) Heart Burn or Pyrosis: -**
See Multan Board Answer No: 15
B) Cause of Heart Burn or Pyrosis: -
See Multan Board Answer No: 21 (B)
- 32. Detritivores: -**
See Dera Ghazi Khan Board Answer No: 8
- 33. Jaundice: -**
See Multan Board Answer No: 22
- 34. Pyrosis: -**
See Multan Board Answer No: 15

Bahawalpur Board
Questions

- 1. What is Jaundice? (A-2007)
- 2. Differentiate between Autotrophic and Heterotrophic Nutrition. (A-2007)
- 3. Write a note on Saprotrophic Nutrition in Plants. (A-2008)
- 4. What are Fluid Feeders? Give two examples. (A-2008)
- 5. Give two main functions of Human Liver. (A-2009)
- 6. What are Fluid Feeders? (A-2009)
- 7. How the Secretion of Gastric Juice is regulated? (A-2011)
- 8. Give the Importance of Predator-Prey Interaction in an Ecosystem. (A-2011)
- 9. Illustrate the structure of a VILLUS. (A-2011)
- 10. What do you know about Radula? (A-2012)
- 11. Define Pyrosis. (A-2012)
- 12. What are Zymogen Cells? (A-2012)
- 13. What is Holozoic Nutrition? Define Assimilation. (A-2013)
- 14. Name two structures involved in the digestive system of Cockroach. (A-2013)
- 15. Write down the substrates on which Aminopeptidase and Erypsin react. (A-2013)

Answers

- 1. Jaundice:-**
See Multan Board Answer No: 22
- 2. Difference between Autotrophic and Heterotrophic Nutrition**

| Autotrophic Nutrition | Heterotrophic Nutrition |
|---|---|
| It is a type of nutrition in which organic compounds are manufactured | It is a type of nutrition in which organic compounds are not manufactured from simple |

| | |
|---|---|
| by living organisms from available inorganic raw material taken from surrounding. | inorganic nutrients, instead they must obtain these from their environment. |
|---|---|

3. **A Note on Saprotrophic Nutrition in Plants: -**

1.

Saprophytic nutrition is the type of nutrition in which plants called saprophytes

secrete extra-cellular enzymes that digest dead organic matter in the soil such as

rotting wood or dead leaves and then absorb these soluble products back into their

cells.

Examples: -*Neothia* (bird’s net or orchid), ***Monotropa*** (Indian pipe).
2.

Absorption of nitrates (that are break down of protein of dead organic matter by

bacteria) by the root hairs of plants is also an example of saprophytic nutrition in

plants.

4. **Fluid Feeders with examples: -**
See Multan Board Answer No: 8

5. **Two main functions of Human Liver: -**

1.

It secretes bile which may be temporarily stored in the gall bladder and released

into the duodenum through the bile duct.
2.

It converts highly toxic ammonia into less toxic urea to be excreted through kidneys.

6. **Fluid Feeders: -**
See Multan Board Answer No: 8

7.

Regulation of secretion of Gastric Juice: -

The secretion of Gastric Juice is regulated by smell, sight and quality of food (protein). But

all these secrete a very small amount of gastric juice. The enzyme presnt in the gastric

juice partially digest protein molecules. When partially digested protein particles touch

the mucasal surface of stomach they stimulate the production of gastrin hormone that is

carried by the blood to the gastric glands and stimulates them to produce a large

quantity of gastric juice.

8.

The Importance of Predator-Prey Interaction in an Ecosystem: -

Predator-Prey Interaction helps in maintaining ecosystem stable.A species in the area

without its natural predator leads to disastrous results as rabbits in Australia without

their predator proved a menace to farmers due to their multiplication to enormous

numbers.

9. **Diagram of the structure of a VILLUS: -**

10. Redula: -

1. Radula is found in almost all the mollusks except bivalves.
2. It is rasping tongue like organs found in the mouth region which consists of dozen to thousands of microscopic, chitinous teeth arranged in rows.
3. It is used for scarping type of macrophagous feeding in Gastropods (snails such as Helix, a garden snail and their relatives) which moves back and forth over the food scarping it into tiny fragments that are then conveyed to digestive tract (i.e. swallowed).
4. Other gastropods are active predator, some using a modified redula to drill through the shells of prey and extract food.

11. Pyrosis: -

See Multan Board Answer No: 15

12. Zymogen Cells: -

Zymogen cells are present in the gastric glands and secrete Pepsinogen an inactive form of Pepsin. Zymogen Cells are also known as Chief Cells.

13. A) Holozoic Nutrition: -

See Gujranwala Board Answer No: 10

B) Assimilation: -

See Multan Board Answer No: 11

14. Names of Two Structures involved in the Digestive System of Cockroach: -

1. **Crop** Stores partly digested food.
2. **Gizzard** Grinds the food.

15. Substrates on which Aminopeptidase and Erypsin react: -

| Enzyme | Substrate |
|--------------------------|--------------|
| 1. Aminopeptidase | Polypeptides |
| 2. Erypsin | Dipeptides |

Dera Ghazi Khan Board

Questions

1. Define Chlorosis. How is it produced? (A-2008)
2. What is Predator-Prey Interaction? How is it helpful for maintaining stability of the Ecosystem? (A-2008)
3. Where Villi are located? Also tell their role. (A-2009)
4. Define Peristalsis. (A-2009)
5. Compare the Dentition in Herbivores and Carnivores. (A-2009)
6. List four main Functions of Oral Cavity in Man. (A-2010)
7. What is the Composition of Gastric Juice? (A-2010)
8. What are Detritivores? Give an example. (A-2010)
9. Differentiate between Constipation and Diarrhea. (A-2011)
10. Enlist the Digesting Enzymes in the Pancreatic Juice of Man. (A-2011)
11. How Adipose Tissue is formed? (A-2011)

- 12. Give the Composition of Saliva. (A-2012)
- 13. What is Botulism? Give its causes. (A-2012)
- 14. Differentiate between Absorption and Assimilation. (A-2012)
- 15. Give two ways by which pepsinogen is activated. (A-2013)
- 16. What is botulism? How it is caused? (A-2013)
- 17. Name the ingredients of Saliva. (A-2013)

Answers

1. **Chlorosis and its Production:** -
Chlorosis is a condition in which plants fail to form sufficient chlorophyll and hence their leaves turn pale yellow. Or
Lack or loss of chlorophyll content in plants is called Chlorosis.
It is produced from short supply of mineral nutrients such as nitrogen, magnesium and potassium in the soil.

2. **Predator-Prey Interaction:** -
It is an interaction or relationship between two organisms that involves the capturing, killing and eating of one (prey) by the other (predator).
Helpful for stability of the Ecosystem:
Predator-Prey Interaction helps in maintaining ecosystem stable. Many kinds of predator are useful to us because they control the populations of organisms that do us harm. A species in the area without its natural predator leads to disastrous results as rabbits in Australia without their predator proved a menace to farmers due to their multiplication to enormous numbers.

3. **Location and Role of Villi:** -
Villi are located over the surface of Ileum.
They absorb sugars, amino acids, fatty acids and glycerol by diffusion or active transport.

4. **Peristalsis:** -
Peristalsis is a rhythmical contraction in the walls of digestive tract that serves to move the contents forward through it. Or
These are characteristic movements of the digestive tract by which food is moved along the cavity of the canal. It consists of the wave of contraction of the circular and longitudinal muscles preceded by the wave of relaxation thus squeezing the food just down along the canal.

5. **Comparison of the Dentition in Herbivores and Carnivores**

| Dentition in Herbivores | Dentition in Carnivores |
|--|--|
| 1. Herbivores have large flat teeth with complex ridges well-suited to grinding. | 1. Carnivores have pointed teeth that lack flat grinding surfaces. |
| 2. Canines are missing. | 2. Canines are large and pointed for catching and tearing prey. |
| 3. Premolars and molars are large | 3. Incisors, premolars, and |

| | |
|---|--|
| <p>and flat. Upper incisors are absent in grazing and browsing herbivores.</p> <p>4. There is a large gap between the incisors and premolars.</p> | <p>molars are all adapted for cutting flesh, cracking bones and reducing the chunk to sizes suitable for swallowing.</p> <p>4. There is no gap between the incisors and premolars.</p> |
|---|--|

6. **Four main Functions of Oral Cavity in Man: -**

1. Selection of Food
2. Grinding or Mastication
3. Lubrication
4. Digestion

7. **The Composition of Gastric Juice: -**

Gasric juice is composed of:

- a. **Mucus**A thick secretion made up of water and glycoprotein that lubricates and protects the stomach lining from self digestion by Pepsin.
- b. **HCl**--Kills the bacteria and activates inactive enzyme pepsinogen into pepsin.
- c. **Pepsinogen**An inactive form of Pepsin (that hydrolyzes protein to yield peptone and polypeptides) which becomes activated into pepsin when exposed to acidic medium.

8. **Detritivores:**

The animals which feed upon fragments of decomposing material (detritus) and contribute to the process of break down are called Detritivores or Detritus feeders.

Or

The animals which feed on organic debris from decomposing plants and animals are called Detritivores.

Example: Earthworm

9. **Differences between Constipation and Diarrhea**

| Constipation | Diarrhea |
|---|--|
| <p>1. It is the slow movement of feces through the large intestine.</p> <p>2. It is associated with large quantities of dry and hard feces due to excessive absorption of water.</p> <p>3. It may lead to piles or hemorrhoids.</p> | <p>1. It is the rapid movement of fecal matter through the large intestine.</p> <p>2. It is associated with watery feces due to less absorption of water and electrolytes.</p> <p>3. It may lead to dehydration that always proves to be fatal especially in children.</p> |

10. **The Digesting Enzymes in the Pancreatic Juice of Man: -**

1. **Pancreatic Amylase** or **Amylopsin**Carbohydrate digesting enzyme
2. **Lipase**Fat digesting enzyme
3. **Trypsinogen**—Inactive form of Trypsin, a protein digesting enzyme

11. Formation of Adipose Tissue:

If one eats too much food than body requirement, surplus food is stored in the cells as fat

called adipose cells or fat cells. These fats are stored in the cytoplasm of cells as droplets.

As these droplets increase in number, they join together to form one large globule of fat

in the middle of the cell pushing the cytoplasm into thin layer and the nucleus to one side.

Groups of fat cells or adipose cells form adipose tissue in the abdomen, around the

kidneys and under the skin.

12. Composition of Saliva: -

Saliva contains:

a. **Water** and **mucus** That lubricate the food

b. **Sodium bicarbonate** and **other salts** That stabilize pH of food for Carbohydrate digestion

c. **Salivary Amylase** or **Ptyalin** Which digests starch and glycogen to maltose

13. Botulism and its causes: -

A) Botulism: -

Botulism is the severe form of food poisoning which is characterized by fatigue,

dizziness, double vision, nausea, vomiting, diarrhea, abdominal pain and if not

treated may lead to cardiac and respiratory paralysis. Or

Botulism is a type of foodborne intoxication (or poisoning). The symptoms of botulism

develop within hours. Patients suffer blurred vision, slurred speech, difficulty in

swallowing and chewing, and labored breathing. The limbs lose their tone and become

flabby, a condition called flaccid paralysis. Often the patients are thought to be suffering

from Guillain-Barre syndrome or myasthenia gravis. The symptoms result from a

process in which toxin penetrates end of nerve cells and inhibits the release of

acetylcholine. Without acetylcholine nerve can not pass into the muscles, and muscles

do not contract. Failure of diaphragm and rib muscles to function leads to respiratory

paralysis and death within a day or two.

B) Causes:

1. Toxin produced by *Clostridium botulinum*, a bacterium.

2. Use of improperly canned or otherwise preserved foods, especially meat that

have traces of toxin of the bacterium. Or

The causative organism is a gram positive anaerobic bacillus *Clostridium botulinum*

that form spores. The spores exist in in the intestines of many humans as well as

numerous fish and birds. They reach the soil in manure, organic fertilizers, and sewage,

and often cling to harvested products. When spores enter the anaerobic environment of

cans, or jars, they germinate to bacilli that produce a powerful toxin called exotoxins
 Bacteria themselves are of little consequence because they fail to grow in the human intestine, but the toxin is lethal once absorbed into the blood stream.

14. Difference between Absorption and Assimilation:

See Multan Board Answer No: 26

15. Two ways by which Pepsinogen is Activated:

1. Pepsinogen is activated to pepsin when it is exposed to acidic medium.
2. It is also activated to pepsin when it is exposed to some already activated pepsin.

16. Botulism and how it is caused: -

See Dera Ghazi Khan Board Answer No:

17. Ingredients of Saliva: -

1. Water and mucus
2. Sodium bicarbonate and other salts
3. Salivary Amylase or Ptyalin

Lahore Board Questions

1. What are the types of Salivary Glands in man? (A-2006)
2. What is Nitrition? (A-2007)
3. What is Chyme? (A-2007)
4. What is Pyrosis? (A-2008)
5. Give the features of Saprophyte. (A-2008)
6. What is Heart Burn? (A-2009)
7. How gall stones are formed? (A-2009)
8. What are Mycorrhizae? (A-2009)
9. What is a Gastrovascular Cavity? (A-2010)
10. How an Adipose Tissue is formed? (A-2010)
11. Give the Composition of Saliva? (A-2010)
12. Differentiate between Absorption and Assimilation. (A-2011)
13. What are the Symptoms shown in Plants of Nitrogen Deficiency and Potassium Deficiency in the Soil? (A-2011)
14. Name Three Pairs of Salivary Glands and also mention their Location. (A-2011)
15. What do you know about Hunger Pang in Human? (A-2012)
16. Name Enzyme found in Saliva. (A-2012)
17. What are Autotrophs? (A-2012)
18. Define Detritivores. (A-2012)
19. What is botulism? Name the bacterium which cause this disease.(Group I-A-2013)
20. Define the term omnivores with two examples. (Group I-A-2013)
21. Define the term heterotrophic. (Group I-A-2013)
22. What is dyspepsia? (Group II-A-2013)
23. Differentiate between secretin and gastrin. (Group II-A-2013)
24. What are the ingredient of gastric juice? (Group II-A-2013)

Answers

1. The types of Salivary Glands in man: -

There are following three types of salivary glands in man:

1. **Parotid glands** Lie in front of the ears
2. **Sublingual glands**-Located at the base of tongue

3. **Submandibular glands** Lie at the base of lower jaw

2. **Nutrition: -**

The word nutrition is used in two related contexts.

- a. First, nutrition is a branch of science that seeks to understand food, its nutrients, how the nutrients are used by the body, how less or over quantities of nutrients lead to ill health.
- b. Second, nutrition refers to all the processes by which we take in food and utilize it, including ingestion, digestion, absorption, and assimilation.

Or

Nutrition is the process by which the organisms obtain energy to maintain the functions of

life, to build the matter and maintain their structures. Or

The sum total of all the processes involved in the taking in and utilization of elements by which growth, repair and maintenance of activities in the organisms are accomplished is called Nutrition.

3. **Chyme: -**

After the food has become mixed with stomach secretions, the resulting semi-solid mixture in the stomach that passes down the gut is called Chyme.

4. **Pyrosis: -**

See Multan Board Answer No: 15

5. **The Features of Saprophyte: -**

1. It is an organism that lives in the food (usually dead organic material).
2. It secretes digesting enzymes into the surroundings and digests the large organic molecules of food into smaller units externally.
3. It absorbs back simple organic molecules produced by this external digestion.
4. It uses these decomposed and absorbed products as a source of energy.

6. **Heart Burn:-**

See Multan Board Answer No: 15

7. **Formation of Gall Stones:**

In the formation of gall stones, the excessive concentration of cholesterol due to diet or metabolic disease such as diabetes and reduction in concentration of bile salts in the bile are of primary importance. Under these conditions cholesterol may precipitate forming cholesterol gall stones.

8. **Mycorrhizae: -**

Mycorrhizae (literally meaning fungus roots) are mutualistic association between certain

fungi and roots of vascular plants (about 95 % of all kinds of vascular plants).

The fungal hyphae dramatically increase the amount of soil contact and total surface area

for absorption and help in direct absorption of phosphorous, zinc, copper and other

nutrients from the soil into roots. The plant on other hand supplies organic carbon to

fungal hyphae.

9. Gastrovascular Cavity: -

It is a central cavity in Cnidarians and Flatworms with a single opening that functions as mouth and anus.

10. Formation of an Adipose Tissue: -

See Dera Ghazi Khan Board See Answer No: 11

11. Composition of Saliva: -

See Dera Ghazi Khan Board Answer No: 12

12. Difference between Absorption and Assimilation: -

See Multan Board Answer No: 26

13. A) Symptoms shown in Plants of Nitrogen Deficiency in the soil: -

1. Leaves particularly older turn pale yellow due to strong chlorosis.
2. Plant growth remains stunted and lateral buds remain dormant.
3. Process of cell division and cell enlargement are inhibited.

B) Symptoms shown in Plants of Potassium Deficiency in the Soil: -

1. Leaf margins turn yellow and brown in color.
2. Premature death of the plants occurs.
3. Irregular chlorosis occurs.
4. Plant is stunted in growth.

14. Three Pairs of Salivary Glands and also mention their Location: -

| Salivary Glands | Location |
|-------------------------|----------------------|
| 1. Parotid glands | In front of the ears |
| 2. Sublingual glands | Below the tongue |
| 3. Submandibular glands | Behind the jaws |

15. Hunger Pang in Human: -

1. It is a mild pain or uncomfortable sensation which person experience in the pit of the stomach due to strong hunger contractions (peristaltic contractions) in the stomach.
2. It occurs due to low blood glucose level.
3. It usually begins 12 to 24 hours after the previous meal or in less time for some people.

16. Name of Enzyme found in Saliva: -

Ptyalin or Salivary Amylase

17. Autotrophs:-

1. They can manufacture organic molecules from inorganic molecules.
2. They produce their own sugars, lipids, protein etc. from CO_2 , H_2O and nitrates.

Examples: Plants, algae, some bacteria etc.

18. Detritivores: -

See Dera Ghazi Khan Board Answer No: 8

19. A) Botulism: -

See Multan Board Answer No: 28 (A)

B) Name of the Bacterium which causes Botulism: -

See Multan Board Answer No: 28 (B)

20. **A) Omnivores: -**
 See Multan Board Answer No: 10
- B) Two Examples:**
 1. Fox
 2. Man
21. **Heterotrophic: -**
 Heterotrophic are organisms which are incapable of manufacturing organic compounds from simple inorganic nutrients and also they obtain organic molecules from the environment in the form of food.
22. **Dyspepsia: -**
 See Rawalpindi Board Answer No: 3
23. **Differences between Secretin and Gastrin: -**
- | Secretin | Gastrin |
|--|--|
| 1. It is produced by intestinal mucosa (duodenum). | 1. It is produced from the endocrine lining of stomach. |
| 2. Acidic food from stomach stimulates its production. | 2. Partly digested protein particles stimulate its production. |
| 3. Secretin stimulates to produce pancreatic juice. | 3. Gastrin stimulates the production of more gastric juice. |
24. **Ingredient of Gastric Juice: -**
 See Dera Ghazi Khan Board Answer No: 7

Gujranwala Board Questions

- What do you know about Saprophytic Nutrition? (A-2007)
- Differentiate between Carnivores and Omnivores. (A-2007)
- What is Pyrosis? (A-2008)
- Give the features of Saprophyte. (A-2008)
- Distinguish Detritivores from Carnivores. (A-2009)
- Name any Two Salivary Glands in Humans. (A-2009))
- What is Botulism? Give its cause. (A-2009)
- What is the Difference between Ingestion and Digestion? (A-2010)
- How does the problem Gall Stones develop? (A-2010)
- What is Holozoic Nutrition? (A-2011)
- What are Detritivores? (A-2011)
- What is Chlorosis? (A-2011)
- Define Peristalsis and Antiperistalsis. (A-2012)
- What is Heart-Burn or Pyrosis? (A-2012)
- What do you know about Fluid Feeders? (A-2012)
- What are hunger pangs? (A-2013)
- What is adipose tissue? What are its functions? (A-2013)
- What are nematocysts? What is their role ingestion of prey? (A-2013)

Answers

1. **Saprophytic Nutrition:**
 It is a type of nutrition in which organisms called Saprotrophs or saprobes or decomposers or absorptive heterotrophs feed on dead organic matter of plants and animals, digest this matter externally with the help of enzymes, absorb back decomposition products and use as a source of energy.

Or
It is a mode of nutrition in heterotrophic organisms which digest their food externally by secreting enzymes, absorb digestive products and use as a source of energy.
Examples: This mode of nutrition is found in most fungi, some bacteria and some plants.

2. **Differences between Carnivores and Omnivores:**

| Carnivores | Omnivores |
|---|--|
| 1. They feed on other animals. | 1. They feed on other animals as well as plants. |
| 2. They have pointed teeth that lack grinding flat surfaces and all teeth especially canines are adapted for catching and tearing prey. | 2. They have the teeth structurally and functionally intermediate between the extremes of specialization attained by the teeth of herbivores and carnivores. |
| Examples: Cats, dogs, lion, tiger etc. | Examples: Crows, fox, bears, humans etc. |

3. **Pyrosis:** -
See Multan Board Answer No: 15

4. **The Features of Saprophyte:** -
See Lahore Board Answer No: 5

5. **Differences between Detritivores and Carnivores: -**

| Detritivores | Carnivores |
|---|---|
| 1. They eat small pieces of organic matters such as broken leaves, feces, body parts left by carnivores or scavengers or decomposers and break them into further smaller particles available for other organisms such as decomposers for food. They also eat decomposers. | 1. They eat other animals and leave the remains for scavengers, detritivores and decomposers. |
| 2. They are usually small animals such as insects, slugs, snails, earthworms and other small animals. | 2. They are usually large animals such as cats, dogs, lion, tiger etc. |

6. **Any Two Salivary Glands in Humans:** -
1. Parotid glands lying in front of the ears

2. Sublingual glands lying at the base of tongue

7. **Botulism and its cause: -**
See Multan Board Answer No: 28

8. **Difference between Ingestion and Digestion: -**

| Ingestion | Digestion |
|---|--|
| 1. It is taking in of complex organic food by the animal. | 1. It is the break down of organic compounds of food into simpler diffusible molecules by the action of enzymes. |
| 2. Food is either taken in the digestive cavity or cells or in some cases both. | 2. Digestion is either extracellular when it occurs in the digestive cavity or intracellular when it takes place within cells or both. |

9. **The problem of Gall Stones: -**
Problem of Gall Stones develops by the precipitation of Cholesterol in the Gall Bladder due to:
1. Too much absorption of water and salts from bile
2. Too much secretion of cholesterol in the bile
3. Inflammation of epithelium of Gall Bladder

10. **Holozoic Nutrition: -**
The nutrition in which complex, non-diffusible food is taken in and digested into smaller diffusible molecules which can be absorbed and assimilated is called Holozoic Nutrition.
It is found in free living animals which have a specialized digestive tract in which various processes occur.

11. **Detritivores: -**
See Dera Ghazi Khan Board Answer No: 8

12. **Chlorosis: -**
See Dera Ghazi Khan Board Answer No: 1

13. **A) Peristalsis:**
Peristalsis is the rhythmic waves of muscular contraction just behind the mass of food in the walls of digestive tract that serves to move food down the tract.

Or
It is the wave of contraction of circular and longitudinal muscles of walls of alimentary canal preceded by the wave of relaxation just behind food moving it down along the canal.

B) Antiperistalsis: -
Antiperistalsis is the reverse waves of muscular contraction in the walls of digestive

tract which travel backward up the digestive tract pushing a large amount of intestinal contents all the back to the duodenum and stomach and even into the mouth leading to vomiting.

14. Heart-Burn or Pyrosis: -

See Multan Board Answer No: 15

15. Fluid Feeders: -

See Multan Board Answer No: 8

16. Hunger Pangs: -

See Lahore Board Answer No: 14

17. Adipose Tissue and its Functions: -

Adipose tissue is the tissue in which surplus fat is stored. It is found in the abdomen, around the kidneys and under the skin. It causes high blood pressure, heart disease diabetes mellitus and stomach disorder.

18. A) Nematocysts: -

Nematocysts are numerous stinging cells embedded in the tentacles of coelenterates.

Each nematocyst consists of a hollow thread coiled within a capsule and a tiny hair like triggerprojecting outside.

B) Role of Nematocyst in Ingestion of Prey: -

When a prey such as *Daphnia* or *Cyclops* comes in contact with the trigger of nematocyst, the hollow thread of nematocyst turns out, ejects poison and prey is paralysed or sometimes killed. Coelenterate such as *Hydra* then graps its prey with its tentacles and pushes it into the digestive cavity through open mouth.

Rawalpindi Board

Questions

1. Define Assimilation. (A-2010)
2. Define Villi. Name the Lymphatic Vessel present in Villi. (A-2010)
3. What is Dyspepsia? (A-2010)
4. What is the Composition of Gastric Juice? (A-2011)
5. Give the names and position of each Salivary Gland in Man. (A-2011)
6. Enlist Basic Steps involved in Holozoic Nutrition. (A-2011)
7. What is Botulism? (A-2012)
8. Differentiate between Ingestion and Egestion. (A-2012)
9. What is the Commonest Cause of Food Poisoning? (A-2012)
10. Enlist enzymes secreted by Pancreas and give their functions. (A-2013)
11. What is anorexia nervosa? (A-2013)
- 12.

Answers

1. Assimilation: -

See Multan Board Answer No: 11

2. **A) Villi: -**
Villi are numerous finger-like outgrowths that project about 1 mm from the surface of mucosa of ilum and consist of a covering of epithelial cells and capillaries of blood and vessels of lymphatic system. They increase the absorptive area about 10 fold.
- B) The Lymphatic Vessel present in Villi:-**
The Lymphatic Vessel presnt in Villi is called **Lacteal**.
3. **Dyspepsia: -**
1. Incomplete or imperfect digestion is called dyspepsia.
2. It is not a disease but symptoms of other disorders which may occur irregularly and in different pattern from time to time.
3. It is characterized by epigastric discomfort following meal, flatulence, heart burn, and vomiting.
4. It may be due to excessive acidity in stomch or faulty function of stomch and intestine or insufficient quality or quantity of bile secretions.
4. **Composition of Gastric Juice: -**
See Dera Ghazi Khan Board Answer No: 7
5. **The names and position of each Salivary Gland in Man: -**
See Lahore Board Answer Nos: 1 and 14
6. **Basic Steps involved in Holozoic Nutrition:**
1. **Ingestion** Taking in of complex food
2. **Digestion** Break down of non-diffusible substances into diffusible ones by enzymes
3. **Absorption** The uptake of diffusible molecules from the digestive tract across a a membrane into the body cells either directly or through a transport medium i.e.blood or lymph
4. **Assimilation** The utilization of absorbed digestive products for production of energy or synthesis of cellular material
5. **Egestion** Elimination of undigested matter from the body
7. **Botulism: -**
See Multan Board Answer No: 28
8. **Differences between Ingestion and Egestion:**

| Ingestion | Egestion |
|---|---|
| 1. It is the intake of complex food. | 1. It is the elimination of residual undigested food. |
| 2. Useful organic substances are taken in. | 2. Wasteful or harmful products are eliminated. |
| 3. In most animal it takes place through mouth which is a permanent opening of digestive tract. | 3. Anus is the opening in the digestive tract of animals that is used for egestion. However, mouth is used for egestion |

| | |
|--|----------------------------------|
| | in case where anus is absent. |
|--|----------------------------------|

- 9. The Commonest Cause of Food Poisoning: -**
 The commonest cause of the food poisoning is the toxin produced by bacteria *Salmonella* and *Campylobacter*.
- 10. Enzymes secreted by Pancreas and their Functions: -**
- Lipase**----It hydrolyzes a small percentage of fats into fatty acids and glycerol.
 - Pancreatic amylase**--- It digests starch into maltose.
 - Trypsin**-----It splits proteins into peptones and polypeptides.
- 11. Anorexia Nervosa: -**
 It is the loss of appetite of young girls due to the fear of becoming obese.
- 12.**

Sargodha Board

Questions

- What is a Hunger Pang? (A-2010)
- Write Two Main Functions of Human Liver. (A-2010)
- Describe the role of Nitrogen and Potassium in Plants briefly. (A-2010)
- Differentiate Juandice and Chlorosis. (A-2011)
- Define Symbiotic Nutrition. Give example. (A-2011)
- Write down Causes and Symptoms of Botulism. (A-2011)
- What are Insectivorous Plants? How they get their Carbohydrates? (A-2012)
- Give Names of Hormones secreted by Digestive System. Also write their Functions. (A-2012)
- What is Pyrosis? Give its Causes. (A-2012)
- What is chlorosis and what is its cause? (A-2013)
- How adipose tissue is formed? (A-2013)
- Differentiate between obligate and facultative parasites. (A-2013)

Answers

- 1. Hunger Pang: -**
 See Lahore Board Answer No: 14
- 2. Two Main Functions of Human Liver: -**
 See Bahawalpur Board Answer No: 5
- 3. A) Role of Nitrogen in Plants: -**
 Nitrogen is essential component of proteins, nucleic acids, chlorophyll and other organic molecules, so the biosynthesis of these nutrients requires nitrogen.
- B) Role of Potassium in Plants: -**
- It plays an important role in stomatal opening and closing.
 - It is essential activater for enzymes involved in the synthesis of certain peptide bonds and carbohydrate metabolism.
 - It is found in higher concentration in the meristematic regions of plants.
- 4. Differences between Juandice and Chlorosis: -**
- | Jaundice | Chlorosis |
|----------|-----------|
| | |

| | |
|---|---|
| 1. It is a liver disease of humans. 2. It is due to prevention of bile pigments from leaving digestive tract and hence accumulation of bile pigments especially bilirubin in the blood. 3. Its symptoms are yellow tint to white of human eyes, skin as well as deep tissues. | 1. It is a plant disease. 2. It is due to the lack or loss of chlorophyll. 3. Its symptoms are yellowish hue in the leaves. |
|---|---|

5. **Symbiotic Nutrition with example: -**

Symbiotic Nutrition is a type of nutrition in which two or more organisms belonging to different species live in close association that is advantageous to both or one another.

Or

It is a mutual nutrition between organisms (belonging to different species) living in association with one another

Examples: -

- Lichen** It is made up of a fungus and algal cells. The alga makes food by photosynthesis while the fungus supplies water and minerals and also protection against desiccation.
- Mycorrhiza** It is an association between a fungus and roots of higher plants. The fungus depends upon photosynthate of the plant. Plants receive water and minerals via fungus.

6. **Causes of Botulism: -**

A) Causes of Botulism: -

- Toxin produced by *Clostridium botulinum*, a bacterium.
- Use of improperly canned or otherwise preserved foods, especially meat that has traces of toxin of the bacterium.

B) Symptoms of Botulism:

Early Symptoms Fatigue, dizziness, double vision, nausea, vomiting, diarrhea, and abdominal pain
Severe CasesCardiac and respiratory paralysis

7. **Insectivorous Plants: -**

- These are plants which have as their prey insects and small birds and supplement their inorganic diet from organic compounds obtained from the prey.
- All of the insectivorous plants are true autotrophs but when they capture prey, their growth becomes rapid.
- They get their nitrogen or protein requirement from the prey.
- In some plants, trapped insects are decomposed by bacteria while in others they are digested by the enzymes secreted by the leaves.

They get their Carbohydrates by Photosynthesis.

8. A) Names of Hormones secreted by Digestive System: -

1. Gastrin
2. Secretin

B) Functions of Hormones: -

1. **Gastrin** Stimulates the Gastric Glands to secrete more Gastric Juice
2. **Secretin** Stimulates the Pancreas and Liver to secrete their secretions.

9. Pyrosis and its Causes: -

See Multan Board Answer No: 15

10. A) Chlorosis: -

Chlorosis is a condition in which plants fail to form sufficient chlorophyll and hence their

leaves turn pale yellow.

Or

Lack or loss of chlorophyll content in plants is called Chlorosis.

B) Causes of Chlorosis: -

Causes of chlorosis are short supply of mineral nutrients such as nitrogen, magnesium and potassium in the soil.

11. Formation of Adipose Tissue: -

See Dera Ghazi Khan Board See Answer No: 11

12. Difference between Obligate and Facultative Parasites. (A-2013)

| Obligate Parasites | Facultative Parasites |
|---|---|
| Obligate parasites live in the host parasitically at all times. | Facultative parasites are capable of living independently of its host at times. |

Faislabad Board

Questions

1. Discuss the Role of Gastrin. (A-2007)
2. Write Main Functions of Human Liver. (A-2008)
3. Give two Examples of Endoparasites. (A-2008)
4. Point out difference between Diarrhea and Constipation. (A-2009)
5. What is Symbiotic Nutrition? (A-2009)
6. What is Jaundice? (A-2009)
7. What is Obesity? (A-2010)
8. What do you know about Botulism? (A-2011)
9. Differentiate between Detritivores and Omnivores. (A-2011)
10. Define Macrophagous Feeding with example. (A-2012)
11. Differentiate between Food Poisoning and Botulism. (A-2012)
12. Define Symbiotic Nutrition. Give example. (A-2012)
13. What are detritivores? Give example. (A-2013)
14. What is diarrhea? (A-2013)
15. What is heart burn or pyrosis? (A-2013)

Answers

1. Role of Gastrin: -

See Multna Board Answer No: 4

2. Main Functions of Human Liver: -

- 1. It forms bile that is stored in the gall bladder and poured into the duodenum by bile duct.
- 2. It converts highly toxic ammonia into less toxic urea to be excreted through kidneys.
- 3. It filters and stores blood.
- 4. It is storage site for vitamins, iron, blood substances used in blood clotting.
- 5. It converts excess glucose into glycogen. When glucose is in short supply, it can convert some of its stored glycogen back into glucose.

3. Two Examples of Endoparasites: -

- 1. **Leech** They are ectoparasites of both aquatic terrestrial animals and suck their blood.
- 2. **Lice** They live in the fur or feathers of mammals and birds and suck blood from their skin.

4. Difference between Diarrhea and Constipation: -

See Dera Ghazi Khan Board Answer No: 9

5. Symbiotic Nutrition: -

See Sargodha Board Answer No: 5

6. Jaundice: -

See Multan Board Answer No: 22

7. Obesity: -

- 1. Obesity means deposition of excessive fat in the body.
- 2. Obese is a person who has abnormal amount of fat on the body.
- 3. Obesity occurs when a person eats too much food than body requirement and the surplus food is stored in the body as fat.
- 4. Fat is stored in the cytoplasm of cells in the form of droplets that later become large globules. These cells are called fat cells or adipose cells.
- 5. Groups of fat cells or adipose cells form adipose tissue around the kidney, in the abdomen and under the skin.

8. Botulism: -

See Multan Board Answer No: 28

9. Differences between Detritivores and Omnivores: -

| Detrivores | Omnivores |
|--|--|
| 1. They feed on decomposing fragments of both animal and plants. | 1. They eat both animals and plants. |
| 2. They are small animals. Examples: Earthworms, Ants | 2. They are large animals. Examples: Crows, fox, human |

10. A) Macrophagous Feeding: -

The process by which animal feeds on large particles is called Macrophagous Feeding. Or
It is the type of feeding in which animal takes in food in the form of large pieces.

B) Examples: Hydra, Helix, Spotting dog fish etc.

11. Difference between Food Poisoning and Botulism: -

| Food Poisoning | Botulism |
|---|---|
| 1. It is an illness from indigestion of food containing toxic substances. | 1. It is a severe form of food poisoning. |
| 2. It is caused by toxins produced by bacteria <i>Salmonella</i> and <i>Compylobacter</i> . | 2. It is caused by toxins produced by bacteria known as <i>Clostridium botulinum</i> . |
| 3. Its symptoms are diarrhea, vomiting and abdominal pain. | 3. Its symptoms are fatigue, dizziness, double vision, head ache, vomiting, diarrhea and abdominal pain. Crardiac and respiratory paralysis may occur. |
| 4. It develops by the use of unpasteurized milk and improperly cooked meat. | 4. It develops by the use of improperly canned or otherwise preserved foods especially meat. |

12. Symbiotic Nutrition with example: -

See Sargodha Board Answer No: 5

13. Detritivores with Example: -

See Dera Ghazi Khan Board Answer No: 8

14. Diarrhea: -

Diarrhea is the rapid movement of watery fecal matter through the large intestine due

to less absorption of water and electrolytes.

Any pathology that irritate and increase the motility of intestinal wall especially colon can cause diarrhea.

Diarrhea may lead to dehydration that always proves to be fatal especially in children.

15. Heart Burn or Pyrosis: -

See Multan Board Answer No: 15

Chapter No: 13 4 SQs

Multan Board

Questions

1. What are the Causes of Asthma? (A-2007)
2. Write Four Properties of Respiratory Surfaces. (A-2007)
3. Air is better Respiratory Medium than Water. Explain. (Model Paper-2006-08)
4. How does gaseous exchange occur in Frog? (Model Paper-2006-08)
5. What is Diving Reflex in Cetaceans? (Model Paper-2006-08)
6. What are Parabronchi? (A-2008)
7. What is Photorespiration? (S-2008)
8. What do you mean by Pulmonary Respiration? (S-2008)

9. Write down Symptoms of Emphysema. (A-2009)
10. State Myoglobin and its function. (A-2009)
11. State Symptoms of Tuberculosis. (A-2009)
12. Define Photorespiration. (S-2009)
13. What are Spiracles? How many Pair of Spiracles are present in Cockroach? (S-2009)
14. What is the amount of CO₂ /100 ml in Arterial and Venous Blood? (A-2010)
15. What are Parabronchi? (A-2010)
16. Differentiate between Organismic and Cellular Respiration. (A-2010)
17. Compare Inhalation and Exhalation in Frog. (S-2010)
18. Define Parabronchi. (S-2010)
19. What are the functions of Nasal Cavity? (A-2011)
20. Differentiate between Glottis and Epiglottis. (A-2011)
21. Write down Four Changes which take place in the body of Diving Mammals. (A-2011)
22. What is Respiratory Distress Syndrome? (S-2011)
23. How does Asthma develop? (S-2011)
24. Give Characters of Respiratory Membrane. (A-2012)
25. How do Exhalation and Inhalation occur in Cockroach? (A-2012)
26. What factors keep the skin of Earthworm moist for gaseous exchange? (A-2013-New)
27. How expiration occurs in man? (A-2013-New)
28. What are Bronchi? (A-2013-New)
29. What is the normal rate of breathing at rest in humans? (A-2013-New)
30. What are Pleura? (A-2013-Old)
31. Briefly describe Tuberculosis. (A-2013-Old)

Answers

1. **The Causes of Asthma: -**

1. The causative allergens are pollens, spores, cold, humidity, pollution etc.
2. Histamine produced during inflammatory reactions of Asthma causes the contraction of bronchioles.

2. **Four Properties of Respiratory Surfaces: -**

1. Surface area of respiratory surfaces should be large in relation to size of organism and should be kept moist.
2. Epithelium of respiratory surfaces must be thin with only one or two cell thick.
3. Concentration gradient must be maintained at the points where diffusion occurs.
4. Respiratory surfaces must contain the network of blood capillaries.

3. **Air is better Respiratory Medium than Water: -**

1. The oxygen content of air is much higher (i.e. 200 ml / litre) than the oxygen content of equal volume of water (i.e. 10 ml / litre).
2. Oxygen diffuses about 8000 times more quickly in air than water.
3. Water is 8000 times denser than air.
4. Water is 50 times more viscous than air.

4. **Gaseous exchange in Frog: -**

Gaseous exchange in frog occurs through the lungs, by skin, and buccal chamber or cavity which are richly supplied with blood vessels.
Gaseous exchange through the skin is known as Cutaneous Respiration.
Gaseous exchange through lungs is known as Pulmonary Respiration.

Gaseous exchange through thin and vascularized lining of the buccal cavity is called Buccal Respiration.

5. Diving Reflex in Cetaceans: -

When Diving Reflex in Cetaceans is activated following events take place in Cetaceans:

1. Breathing stops.
2. The rate of heart beat slows down to one tenth of the normal rate.
3. The consumption of oxygen and energy is reduced.
4. Most of the blood is supplied to brain and heart (muscles) and little to skin, digestive system and other organs.
5. Muscles shift from aerobic to anaerobic respiration.

6. Parabronchi: -

Parabronchi are numerous tiny, thin walled, highly vascularized parallel ducts in the lungs of birds that are open at both ends and allow continuous flow of air in one direction.

The walls of the parabronchi, containing blood capillaries in which direction of blood flow is opposite to the direction of air in parabronchi, are chief sites of gaseous exchange between air and blood.

7. Photorespiration: -

It is a series of chemical reactions, occurring in plants when CO₂ levels are low and oxygen levels are high, in which ribulose biphosphate carboxylase / oxygenase (rubisco) fixes oxygen instead of carbon dioxide. Or

The photorespiration is a process in which ribulose biphosphate carboxylase / oxygenase (rubisco) fixes oxygen instead of carbon dioxide which results in lowering the overall rate of carbon dioxide fixation and plant growth. Or

It is a respiratory activity occurring in plants during day time in which oxygen is absorbed and carbon dioxide is released and as a result of which overall fixation of carbon dioxide and plant growth is reduced.

8. Pulmonary Respiration: -

The exchange of gases on land through lungs is called Pulmonary Respiration. It usually occurs in animal living on land.

9. Symptoms of Emphysema: -

The person suffering from emphysema becomes depressed, irritable and sluggish. He can not oxygenate his blood properly and least exertion makes him breathless and exhausted.

10. A) Myoglobin:

1. It is a hemoglobin-like iron containing protein occurring in muscle fibers.
2. It is also known as muscle hemoglobin.
3. It is a small protein composed of just one polypeptide chain associated with an iron containing ring structure of heme prosthetic group that can bind with

one molecule of oxygen.

B) Function of Myoglobin: -

1. It serves as an intermediate compound for the transfer of oxygen from blood (hemoglobin) to tissues (metabolic processes of muscle cells).
2. It stores some oxygen in the tissues until it is utilized during metabolism.

11. Symptoms of Tuberculosis: -

Fever, cough (sometimes with blood in sputum), pain in chest, short ness of breath, weight loss and poor appetite.

12. Photorespiration: -

See Multan Board Answer No: 7

13. A) Spiracles:

1. Spiracles are minute slit like external openings of tracheae of traceal system in Arthropods.
2. Spiracles can be opened and closed by valves.
3. Air passes in and out of tracheae by way of spiracles.

B) Pair of Spiracles present in Cockroach: -

There are ten pairs of spiracles on lateral sides of Cockroach; first two pairs lie in the thorax while the rest eight are in each of the eight abdominal segments.

14. The amount of CO₂ /100 ml in Arterial and Venous Blood: -

1. The amount of CO₂ /100 ml in Arterial Blood is 50 ml / 100 ml of blood.
2. The amount of CO₂ / 100 ml in Venous Blood is 54 ml / 100 ml of blood.

15. Parabronchi: -

See Multan Board Answer No: 6

16. Differences between Organismic and Cellular Respiration: -

| Organismic Respiration | Cellular Respiration |
|---|--|
| 1. It includes all those steps involved in the transport of oxygen from enironemnt to respiratory surfaces and then to body cells. | 1. It includes all biochemical reactions which extract chemical energy of glucose and other compounds and convert it into the form of ATP molecules. |
| 2. It is involed in the supply of O ₂ necessary for cellular respiration and removal of CO ₂ thus produced from the body. | 2. It is directly involved in the production of energy, necessary for all living activities. |

17. Comparison of Inhalation and Exhalation in Frog: -

| Inhalation in Frog | Exhalation in Frog |
|---|--------------------------------------|
| 1. It is intake of air from environment into the lungs. | 1. It is removal of consumed air out |

| | |
|---|---|
| <p>2. The nostrils open, glottis closes, floor of buccal cavity is lowered and air is drawn from environment into buccal cavity.</p> <p>3. The nostrils close, glottis opens, floor of buccal cavity is raised and air of buccal cavity is forced into lungs.</p> | <p>of lungs after gaseous exchange has occurred.</p> <p>2. The nostrils open, glottis closes, floor of buccal cavity is raised and air is moved out of the buccal cavity into the atmosphere.</p> <p>3. The nostrils close, glottis opens, floor of buccal cavity is lowered and air of lungs is forced into buccal cavity.</p> |
|---|---|

18. **Parabronchi: -**
See Multan Board Answer No: 6
19. **The Functions of Nasal Cavity: -**
The functions of Nasal Cavity are to:

a. Warm the airThis is accomplished by the presence of a plexus of veins in the subcutaneous connective tissues.

b. Moisten the air Moisture is derived from mucus secretedd by mucus secreting cells.

c. Clean the inspired air Dust particles from air are removed by the hairs and sticky surface of the mucus membrane.

20. **Difference between Glottis and Epiglottis: -**

| Glottis | Epiglottis |
|--|---|
| <p>It is opening of the larynx which allows passage of air in and out of the lungs and is also involved in voice production.</p> | <p>It is one of the nine cartilage of larynx (or a flap of tissue) that serves as a lid which automatically covers glottis during the act of swallowing.so as to prevent the entry of food or liquids into the glottis.</p> |

21. **Four Changes taking place in the body of Diving Mammals: -**

1. Breathing stops.

2. The rate of heart beat slows down to one tenth of the normal rate.

3. Most of the blood is supplied to brain and heart (muscles) and little to skin, digestive system and other organs.

4. Muscles shift from aerobic to anaerobic respiration.

22. **Respiratory Distress Syndrome: -**
It is a condition in newborn premature babies, especially in infants with a gestation age of

less than 7 months, in which surfactant secreted by the alveoli is so greatly depressed that
causes a serious tendency for the lungs of these babies to collapse or to become filled with
fluid.

23. Development of Asthma: -

1. First contact of bronchi and bronchioles with pollens, spores, cold, humidity, pollution, dust, animal fur etc causes local sensitisation of bronchi and bronchioles and release of inflammatory chemicals such as histamines into the circulatory system that cause severe contraction of bronchi and bronchioles.
2. Second contact of bronchi and bronchioles with such allergens causes their constriction and secretion of thick mucus that cause dyspnoea (difficult breathing).

24. Characters of Respiratory Membrane: -

See Multan Board Answer No: 2

25. Exhalation and Inhalation in Cockroach: -

A) Exhalation in Cockroach: -

When abdomen contracts, the anterior four pairs of spiracles close and posterior six pairs of spiracles open and air is forced through the tracheae and out of the body.

B) Inhalation in Cockroach:

When abdomen expands, the first four pairs of spiracles open and the air rushes in through these spiracles into trachioles.

26. Factors that keep the skin of Earthworm moist for gaseous exchange: -

1. The secretion of epidermal mucous gland cells
2. Coelomic fluid exuding out through dorsal pores

27. Expiration in Man: -

During expiration in man:

- i. Muscles of ribs relax and ribs move downward and inward
 - ii. Muscles of diaphragm also relax and diaphragm becomes more domelike
- Due to these two events, space of the chest cavity is reduced that exerts

pressure on lungs and
air inside lungs is moved out of the lungs.

28. Bronchi: -

Bronchi are the branches of trachea in terrestrial vertebrates that lead to lungs.

Or

Bronchi (sing.bronchus) are two main branches of trachea that enter the right and left lungs as well as immediate branches of each bronchus within the lungs. Or

29. Normal Rate of Breathing at Rest in Humans: -

Normal rate of breathing at rest in humans is 15-20 times per minute.

30. Pleura: -

See Lahore Board Answer No: 4

31. Brief Description of Tuberculosis: -

Tuberculosis is an airborne disease of the lungs caused by Myobacterium tuberculosis is an

air borne disease of the lungs and accompanied by degeneration of the lung tissue and spread to other organs. Pulmonary tuberculosis is a disease of lungs in which inside of lung is damaged resulting in cough and fever. It is more common in poor people. Malnutrition and poor living conditions facilitate *Mycobacterium* to grow. The disease is curable with proper medical attention. It is a contagious disease. Or

1. **Causative agent:**
Tuberculosis is caused by *Mycobacterium tuberculosis*, the "tubercle" bacillus.
2. **Transmission:**
It is a contagious disease as *Mycobacterium* enters the respiratory tract in droplets. People who live in urban crowded areas often contract tuberculosis because malnutrition and a generally poor quality of life contribute the establishment of disease and overcrowding increases the concentration of bacilli in air.
3. **Pathology:**
About 10 percent of people who contract tuberculosis experience chronic cough, chest pain, and high fever, and they expel rust-colored sputum containing blood. The remaining 90 percent of victims exhibit no readily distinguishable symptoms, except malaise, fever, and weight loss. In these cases body responds to the disease by forming a wall of white blood cells, calcium salts, and fibrous materials around the organisms. As these materials accumulate in the lung, a hard nodule called a tubercle arises (hence the name tuberculosis).

Bahawalpur Board Questions

1. Define Cellular Respiration. (A-2007)
2. What is Respiratory Distress Syndrome in Premature Human Infants? (A-2007)
3. What is Asthma? How is it caused? (A-2008)
4. What is Respiratory Distress Syndrome? How is it caused? (A-2008)
5. What are Parabronchi? (A-2009)
6. What are Alveoli? Give their function. (A-2009)
7. Define Photorespiration. (A-2010)
8. Distinguish between Stomata and Lenticels. (A-2010)
9. Name Respiratory Pigment of Muscle and give its role. (A-2010)
10. Write Two Properties of Respiratory Surfaces in Animals. (A-2011)
11. What are Parabronchi? (A-2011)
12. Define Inhalation and Exhalation in Frog. (A-2011)
13. Differentiate between Bronchi and Bronchioles. (A-2013)
14. How organismic respiration is different from cellular respiration? (A-2013)
15. Define Photo Respiration. (A-2013)
16. What is Respiratory Distress Syndrome? (A-2013)

Answers

1. **Cellular Respiration: -**
Cellular Respiration is a complex process of oxidation-reduction in which food is

oxidized to release energy. Or
Cellular Respiration is the process by which cell utilizes oxygen, produces carbndioxide, extracts and conserves the energy from food molecules in biologically useful form such as ATP.

2. **Respiratory Distress Syndrome in Premature Human Infants: -**
See Multan Board Answer No: 22

3. **A) Asthma:**
It is a lung disease characterized by diffuculty in breathing, wheezing and coughing caused by spasmodic contraction of the bronchi and bronchioles.
B) How Astma is caused: -
Asthma is usually the result of allergic reaction to pollen, spores, cold, humidity, pollution etc. Histamine produced as a result of allergic reaction also cause severe contraction of the bronchi and bronchioles.

4. **A) Respiratory Distress Syndrome:**
It is a common syndrome in premature borne infants in which lungs have serious tendency to collapse.
B) Cause of Respiratory Distress Syndrome:
Respiratory Distres Syndrome occurs in premature infants because enough secretory surfactant (mixture of lipoprotein molecules produced by produced by cells of alveolar epithelium and plays a major role in preventing alveolar collapse) is not produced in these infants.

5. **Parabronchi: -**
See Multan Board Answer No: 6

6. **A) Alveoli:**
1. Alveoli (sing. Alveolus) are tiny, thin walled, blind ended sacs within the lungs in which bronchioles terminate.
2. Each alveolus is lined by an extremely thin single layer of epithelial cells.
2. They are surrounded by extremely thin extensive capillary network.
3. The internal area of alveoli is provided with a thin layer of fluid containing surfactant that reduces the internal surface area to prevent it from collapsing during gas exchange.
B) Function of Alveoli: -
The walls of the alveoli are the sites where all the gaseous exchange between the air and blood takes place.

7. **Photorespiration: -**
See Multan Board Answer No: 7

8. **Differences between Stomata and Lenticels: -**

| Stomata | Lenticels |
|-----------------------------|------------------------------|
| 1. Stomata are the pores in | 1. Lenticels are the special |

| | |
|--|--|
| <p>the cuticularized epidermis (usually lower) of the leaves.</p> <p>2. Each stoma is formed of two living guard cells which can be opened or closed and gaseous exchange occurs when stoma is opened.</p> | <p>pores in the cork tissue in the stem below the epidermis.</p> <p>2. Lenticels are localized regions of loosely packed dead cells of cork with large intercellular air spaces between them through which respiratory gases can move freely in and out of stem.</p> |
|--|--|

9.

A) Name of Respiratory Pigment of Muscle: -

The name of Respiratory Pigment of Muscle is Myoglobin.

B) Role of Respiratory Pigment of Muscle:

1.

It serves as an intermediate compound for the transfer of oxygen from blood to tissues.

2.

It stores some oxygen in the tissues until it is utilized during metabolism.
10.

Two Properties of Respiratory Surfaces in Animals: -

1.

Surface area of respiratory surfaces should be large in relation to size of organism and should be kept moist.

2.

Epithelium of respiratory surfaces must be thin with only one or two cell thick.
11.

Parabronchi: -

See Multan Board Answer No: 6
12.

A) Inhalation in Frog:

1.

It is the intake of air.

2.

It is completed in following two steps.

a.

With glottis closed and external and internal nostrils opened, the floor of buccal cavity is lowered and air is drawn into the buccal cavity through nostrils.

b.

The nostrils close and glottis opens, the the floor of cavity is raised forcing air of buccal cavity into lungs.

B) Exhalation in Frog: -

1.

It is removal of consumed air out of the lungs.

2.

It is completed in following two steps.

a.

With nostrils closed, opened glottis and lowered floor of buccal cavity, air from lungs is forced into buccal cavity.

b.

The nostrils open, glottis closes, rising of floor occurs moving air out of the buccal cavity into the atmosphere.
13.

Differences between Bronchi and Bronchioles: -

| Bronchi | Bronchioles |
|---|---|
| 1. Branchi are the branches of trachea and two main bronchi | 1. Bronchioles are the branches of smaller bronchi and have a |

| | |
|--|--|
| formed by division and sub-division. 2. Bronchi have the same cartilage rings as trachea, but are progressively replaced by cartilage plates. 3. Two bronchi continue to divide and subdivide and ultimately form bronchioles. | diameter of one millimeter or less. 2. Bronchioles totally lack cartilages. 3. They continue to divide and subdivide and terminate into air sacs. |
|--|--|

14. **Organismic Respiration different from Cellular Respiration:** -
 See Multan Board Answer No: 16
15. **Photo Respiration:** -
 See Multan Board Answer No: 7
16. **Respiratory Distress Syndrome:** -
 See Multan Board Answer No: 22

Dera Ghazi Khan Board

Questions

- What are Parabronchi? Give their role. (A-2008)
- Give Respiration in Hydra with brief description. (A-2008)
- Why Air is Better Respiratory Medium than Water? (A-2009)
- What is Respiratory Distress Syndrome? (A-2009)
- What are Stomata? Give their approximate number in leaves of Tobacco Plant? (A-2010)
- Distinguish between Oxyhemoglobin and Carboxyhemoglobin. (A-2010)
- What is Carcinoma? (A-2010)
- Write the Properties of Respiratory Surfaces in Animals. (A-2011)
- What is Respiratory Distress Syndrome? (A-2011)
- Differentiate between Respiration and Breathing. (A-2011)
- Name Some Respiratory Disorders. (A-2012)
- What is Respiratory Distress Syndrome? (A-2012)
- What is Asthma? (A-2012)
- Write properties Good Respiratory Surfaces. (A-2012)
- Give changes when diving reflex is activated. (A-2013)
- Name the causative agent of tuberculosis. (A-2013)
- What are parabronchi? (A-2013)
- Define photorespiration. Name enzyme involved in this process.(A-2013)

Answers

1. **A) Parabronchi:**
 Parabronchi are numerous tiny, thin walled, highly vascularized parallel ducts in the lungs of birds that are open at both ends and allow continuous flow of air in one direction which is opposite to the flow of blood in the capillaries surrounding them.
- B) Role of Parbronchi: -**
 The walls of the parbronchi are the sites where exchange of gases between air and blood takes place.

- 2. Respiration in Hydra with brief description: -**
 Hydra is a diploblastic organism (with two layers of cells i.e. Ectoderm and Endoderm) which has no specialized organs for respiration. Since most of its cells are in direct contact with water, so the ectodermal cells exchange gases with external water while endodermal cells exchange gases with water that comes within gastro-vascular cavity.
- 3. Air better Respiratory Medium than Water: -**
 See Multan Board Answer No: 3
- 4. Respiratory Distress Syndrome: -**
 See Multan Board Answer No: 22

- 5. A) Stomata:**
1. Stomata (singular-stoma) are numerous pores in the cuticularized epidermis of leaves.
 2. Each stoma is formed by two modified epidermal bean-shaped guard cells and unlike other epidermal cells they have chloroplasts with thicker inner and thinner outer walls.
 3. Stomata can be opened or closed depending upon the turgidity of guard cells.
 4. Stomata are the sites where exchange of gases as well as evaporation of water takes place.
- B) Approximate number of Stomata in leaves of Tobacco Plant: -**
 There are approximately 12000 stomata per square centimeter of leaf surface are present in leaves of Tobacco Plant.

6. Differences between Oxyhemoglobin and Carboxyhemoglobin: -

| Oxyhemoglobin | Carboxyhemoglobin |
|---|--|
| 1. It is an unstable compound formed by the combination of hemoglobin and oxygen. | 1. It is an unstable compound formed when carbon dioxide combines with amino group of hemoglobin. |
| 2. It is formed at sites where oxygen tension is very high and dissociates into oxygen and hemoglobin where oxygen tension is low. | 2. It is formed at sites where carbon dioxide pressure is very high and dissociates into carbon dioxide and hemoglobin where carbon dioxide tension is low. |
| 4. 19.6 ml of oxygen / 100 ml of blood is carried from lungs to tissues in the form of oxyhemoglobin. | 3. 25 % of carbon dioxide is carried from tissues to lungs in the form of carboxyhemoglobin. |

- 7. Carcinoma: -**
1. Carcinoma or lung cancer is one of the most serious diseases of respiratory system.

2. It is basically malignant tumor of potentially unlimited growth that expands locally by invasion and systematically by metastasis.
3. It is estimated that 90 % lung cancer is caused by smoking.
8. **Properties of Respiratory Surfaces in Animals: -**
See Multan Board Answer No: 2

9. **Respiratory Distress Syndrome: -**
See Multan Board Answer No: 22

10. **Differences between Respiration and Breathing: -**

| Respiration | Breathing |
|--|--|
| <p>1. Respiration is the oxidation of food to release energy and includes all those steps that help to supply oxygen to cells for oxidation of food and the removal of carbon dioxide from the body.</p> <p>2. It includes breathing, gas exchange, gas transport and cellular respiration.</p> <p>3. It involves both mechanical and Chemical aspects of respiration.</p> | <p>1. It is simply the exchange of gases between environment and the respiratory structures (lungs or gills) from air or water.</p> <p>2. It is one of the sub-stage of respiration.</p> <p>3. It involves only mechanical aspects of respiration.</p> |

11. **Some Respiratory Disorders: -**
Some Respiratory Disorders are:
- Lung Cancer or Carcinoma
 - Tuberculosis
 - Asthma
 - Emphysema

12. **Respiratory Distress Syndrome: -**
See Multan Board Answer No: 22

13. **Asthma: -**
It is a lung disease characterized by difficulty in breathing, wheezing and coughing caused by spasmodic contraction of the bronchi and bronchioles. Or
Asthma is a condition of allergic nature characterized by spastic contraction of the smooth muscles in the bronchioles which causes paroxysm of extremely difficult breathing, particularly exhalation producing loud wheezing noises usually followed by a period of complete relief. Or
Asthma is a disease of bronchi and bronchioles that is marked by wheezing, breathlessness and sometimes cough and expectoration. The airways are sensitive to wide range of allergens such as pollens, spores etc.that cause constriction of bronchi and bronchioles.

Some degree of bronchial inflammation also occurs that reduces the diameter of airways.

14. **Properties Good Respiratory Surfaces: -**
See Multan Board Answer No: 2
15. **Changes when Diving Reflex is activated: -**
See Multan Board Answer No: 21
16. **Name of the causative agent of Tuberculosis: -**
Mycobacterium tuberculosis, the "tubercle" bacillus (rod)
17. **Parabronchi: -**
See Multan Board Answer No: 6
18. **A) Photorespiration: -**
See Multan Board Answer No: 7
B) Name of Enzyme involved in Photorespiration:
Rubisco (ribulose biphosphatecarboxylase/oxygenase)

Lahore Board Questions

1. What are the Two Properties of a Respiratory Surface? (A-2006)
2. What is Photorespiration? (A-2007)
3. What are Spiracles? (A-2007)
4. What are Pleura? (A-2008)
5. What is Diving Reflex? (A-2008)
6. How does Breathing differ from Respiration? (A-2009)
7. What is Respiratory Distress Syndrome? (A-2009)
8. Differentiate between External Respiration and Cellular Respiration. (A-2010)
9. Differentiate between Inspiration and Expiration. (A-2010)
10. What is Diaphragm? State its role in Breathing. (A-2010)
11. What are Two Properties of Respiratory Surfaces in Animals? (A-2010)
12. What is Operculum? (A-2011)
13. Why air is Better Respiratory Medium? (A-2011)
14. What do you know about Counter Current Exchange? (A-2011)
15. How Respiration takes place through Cork Tissues? (A-2012)
16. What is Operculum? (A-2012)
17. What are Causes of Asthma? (A-2012)
18. What are Functional Units of Lungs? (A-2012)
19. Differentiate between Inspiration and Expiration. (A-2012)
20. What is respiratory Distress Syndrome? (A-2012)
21. What is photorespiration? (Group I-A-2013)
22. What is respiratory distress syndrome? (Group I-A-2013)
23. How the volume of chest cavity is reduced during expiration? (Group I-A-2013)
24. How the concentration of CO₂ affects the the capacity of hemoglobin to combine with O₂? (Group I-A-2013)
25. What is Operculum? (Group II-A-2013)
26. Define the term photorespiration. (Group II-A-2013)
27. What is cutaneous respiration? (Group II-A-2013)
28. What do you know about diving reflex? (Group II-A-2013)

Answers

1. **The Two Properties of a Respiratory Surface: -**
See Bahawalpur Board Answer No: 9
2. **Photorespiration: -**

3. **Spiracles: -**

Spiracles are minute external openings of tracheae of tracheal system in Arthropods through which air passes in and out of tracheae and can be opened and closed by valves.

4. **Pleura: -**

Pleura or pleural membranes are two thin membranes which enclose each lung and within which there is fluid filled cavity known as pleural cavity. Fluid in the pleural cavity acts as a lubricant.

5. **Diving Reflex: -**

See Multan Board Answer No: 6

6. **Difference between Breathing and Respiration: -**

See Dera Ghai Khan Board Answer No: 10

7. **Respiratory Distress Syndrome: -**

See Multan Board Answer No: 22

8. **Difference between External Respiration and Cellular Respiration: -**

| External Respiration | Cellular Respiration |
|--|---|
| It includes all the steps that transport oxygen obtained from the inhaled air or water to each cell of the body and release of carbon dioxide from the cells to respiratory structures for exhalation. | It includes all biochemical reactions which extract chemical energy of glucose and other compounds and convert it in the form of ATP molecules. |

9. **Differences between Inspiration and Expiration:**

| Inspiration | Expiration |
|---|--|
| 1. It is the process of taking in of air from atmosphere upto lungs. 2. Contraction of muscles of ribs and diaphragm, causes elevation of ribs and makes the diaphragm flat due to which thoracic cavity is enlarged and negative pressure is developed inside the thoracic cavity as well as lungs and air is rushed into the lungs through | 1. It is the process of giving out of air from lungs to external environment. 2. Relaxation of muscles of ribs and diaphragm settles down the ribs and makes the diaphragm dome shaped, thus reducing the thoracic cavity, and pressure is exerted on the lungs and air is moved out through respiratory passage. |

| | |
|----------------------|--|
| respiratory passage. | |
|----------------------|--|

10. **A) Diaphragm:**

1. It is a sheet of skeletal muscles which separates the chest cavity and lungs from the abdominal cavity.
2. The shape of diaphragm is more dome-like when its muscles relax and less dome-like or flat when its muscles contract.

B) Role of Diaphragm in Breathing: -

It is involved in exchanging the air in and out of the lungs.
 In inspiration muscles of diaphragm contract and it moves downward, becomes less dome shaped or flat, enlarging the thoracic cavity due to which air rushes into the lungs.
 In expiration diaphragm is relaxed, restores its normal position and becomes more dome shaped, reducing the chest cavity due to which air is expelled out.

11. **Two Properties of Respiratory Surfaces in Animals: -**

See Bahawalpur Board Answer No: 9

12. **Operculum: -**

See Lahore Board Answer No: 16

13. **Air better Respiratory Medium: -**

See Multan Board Answer No: 3

14. **Counter Current Exchange: -**

The exchange of gases between blood and air or water when they flow in opposite direction is called Counter Current Exchange.
 Examples:
 1. In birds the gaseous exchange occurs between the parabronchi and blood capillaries.
 The direction of blood flow in the lungs is opposite to that of air flow through the parabronchi. This counter current exchange increases the amount of oxygen which enters blood.
 2. In fishes gas exchange is facilitated in gills due to counter current flow of water and blood. In the capillaries of each lamella of gills blood flows in direction opposite to the movement of water across the gills. In fishes counter current flow is very effective as it enables the fish to extract up to 80 %-90 % of the oxygen from water that flows over the gills.

15. **Respiration through Cork Tissues: -**

Cork tissues are impermeable to water and gases, yet the livng internal sells of woody stem requires oxygen and must be able to exchange gases with the surrounding atmosphere. As a stem thickens from secondary growth, the epidermis including stomata that exchange gases for the herbaceous stems, dies. Stomata are replaced by lenticels which are numerous small,

pale, raised areas on the bark of tree consisting of loosely arranged cells that allow gas exchange between the external atmosphere and the living tissues immediately beneath the bark of woody plants.

16. Operculum: -

It is a flat bony external protective covering over gill chamber in bony fishes.

Or

It is lateral bony protective flap of body wall that extends posteriorly from the head and covers the gills, in bony fishes.

17. Causes of Asthma: -

- a. The causative allergens are pollens, spores, cold, humidity, dust, pollution, animal fur etc.
- b. Histamine produced during inflammatory reactions of asthma causes the contraction of bronchioles.

18. Functional Units of Lungs: -

Air sacs are the functional units of lungs. Each air sac consists of several microscopic single layered structures called alveoli. Overlaying the alveoli there is a rich network of blood capillaries to produce an excellent site for the exchange of gases.

19. Difference between Inspiration and Expiration: -

See Lahore Board Answer No: 9

20. Respiratory Distress Syndrome: -

See Multan Board Answer No: 22

21. Photorespiration: -

See Multan Board Answer No: 7

22. Respiratory Distress Syndrome: -

See Multan Board Answer No: 22

23. Reduction of the volume of Chest Cavity during Expiration: -

The volume of chest cavity during expiration is reduced due to:

- a. Relaxation of muscles of ribs moving them downward and inward
- b. Relaxation of muscles of diaphragm becoming it more domelike

24. Affects of concentration of CO₂ on the capacity of Hemoglobin to combine with O₂: -

Increasing concentration of CO₂ decreases the capacity of hemoglobin to combine with oxygen, hence favouring the greater liberation of oxygen from the blood to the tissues where carbon dioxide concentration is very high.

25. Operculum: -

See Lahore Board Answer No: 16

26. Photorespiration:

See Multan Board Answer No: 7

27. Cutaneous Respiration: -

The gaseous exchange through skin is known as cutaneous respiration. It occurs in frogs.

- 28. Diving Reflex: -**
See Multan Board Answer No: 6

Gujranwala Board Questions

1. How much CO₂ is present in Venous and Arterial Blood? (A-2006)
2. Write Two Properties of Respiratory Surface in Animals. (A-2007)
3. What do you know about Expiration? (A-2007)
4. Define the Alveoli. Give their function. (A-2008)
5. Give percentage of CO₂ in Venous and Arterial Blood. (A-2008)
6. Differentiate between Organismic-Respiration from Cellular Respiration. (A-2009)
7. What are Parabronchi? (A-2009)
8. Give the Composition of Exhaled Air in Man. (A-2010)
9. What keeps the Skin of Earthworm moist for Gaseous Exchange? (A-2010)
10. How pH affects the Combining Capacity of Oxygen to Hemoglobin? (A-2010)
11. Differentiate between Stomata and Lenticels. (A-2011)
12. What are Vocal Cords? Write their Functions. (A-2011)
13. Write the cause of Lung Cancer. (A-2011)
14. Compare Water Medium with Air Medium with respect to Respiration. (A-2011)
15. Why Air is a better Respiratory Medium than Water? (A-2012)
16. Write the causes of Lung Cancer. (A-2012)
17. What is pulmonary tuberculosis? (A-2013)
18. What are the roles of nasal cavity in man? A-2013)
19. Define photorespiration. (A-2013)
20. What are parabronchi? A-2013)

Answers

1. **CO₂ present in Venous and Arterial Blood: -**
See Multan Board Answer No: 14
2. **Two Properties of Respiratory Surface in Animals: -**
See Bahawalpur Board Answer No: 9
3. **Expiration: -**
 1. It is the process of giving out of air from lungs to external environment.
 2. Relaxation of muscles of ribs and diaphragm settles down the ribs and makes the diaphragm dome shaped, thus reducing the thoracic cavity, and pressure is exerted on the lungs and air is moved out through respiratory passage.
4. **Alveoli and their function: -**
See Bahawalpur Board Answer No: 6
5. **Percentage of CO₂ in Venous and Arterial Blood: -**
Percentage of CO₂ in Venous and Arterial Blood is
6. **Differences between Organismic-Respiration and Cellular Respiration: -**
See Multan Board Answer No: 16
7. **Parabronchi: -**
See Multan Board Answer No: 6
8. **The Composition of Exhaled Air in Man: -**
Exhaled air in Man has gases in following composition.
 1. Oxygen 16 %
 2. Carbon dioxide 4 %
 3. Water vapors saturated
 4. Nitrogen 79 %

- 9. Keeping the Skin of Earthworm moist for Gaseous Exchange: -**
The skin of Earthworm is kept moist by mucous from mucous glands in the skin and coelomic fluid exuding out through dorsal pores for gaseous exchange.
- 10. Affects of pH on the Combining Capacity of Oxygen to Hemoglobin: -**
1. Decline in pH of blood decreases the combining capacity of oxygen to hemoglobin because decreased pH results from an increase in hydrogen ions which combine with protein part of hemoglobin molecules causing a decrease in the ability of hemoglobin to bind oxygen.
2. An increase in blood pH results in an increased ability of hemoglobin to bind oxygen.
- 11. Differences between Stomata and Lenticels:**
See Bahawalpur Board Answer No: 8
- 12. A) Vocal Cords:**
1. Vocal cords are two flexible bands of connective tissue that protrude from the lateral walls of the larynx towards the centre of the glottis.
2. During normal breathing vocal cords are wide open to allow easy passage of air.
- B) Functions of Vocal Cords:**
They help in voice production. During voice production vocal cords move together so that passage of air between them will cause their vibration, hence voice production.
- 13. The cause of Lung Cancer: -**
Lung Cancer occurs when inner lining of lungs is exposed continuously to unhealthy air containing smoke and other pollutants. It is estimated that 90 % of lung cancer is caused by smoking. More than ten compounds of tar of tobacco smoke are involved to cause cancer.

14. Comparison of Water Medium with Air Medium with respect to Respiration: -

| Water Medium | Air Medium |
|---|---|
| 1. The oxygen content of air is 200 ml / litre. | 1. The oxygen content of water is 10 ml / litre. |
| 2. Diffusion of oxygen in water is very slow. | 2. Oxygen diffuses about 8000 times more quickly in air than water. |
| 3. Water is 8000 times denser than air. | 3. Oxygen is very lighter than water. |
| 4. Water is 50 times more viscous than air. | 4. Oxygen is 50 times less viscous than water. |

15. **Air a better Respiratory Medium than Water: -**
See Multan Board Answer No: 3
16. **The Causes of Lung Cancer: -**
See Gujranwala Board Answer No: 13
17. **Pulmonary Tuberculosis: -**
Pulmonary Tuberculosis is a disease of lungs in which inside of lung is damaged resulting in cough and fever.
It is caused by a bacterium *Myobacterium tuberculosis*.
18. **The Roles of Nasal Cavity in Man: -**
See Multan Board Answer No: 19
19. **Photorespiration: -**
See Multan Board Answer No: 7
20. **Parabronchi: -**
See Multan Board Answer No: 6

Rawalpindi Board
Questions

1. What is structural difference between Hemoglobin and Myoglobin? (A-2010)
2. Write down the Types of Respiration in Frog. (A-2011)
3. Differentiate between Photorespiration and Cellular Respiration. (A-2011)
4. What is Asthma? (A-2011)
5. Why Air is is best Respiratory Medium than Water? (A-2012)
6. Differentiate between Composition of Inhaled and Exhaled Air. (A-2012)
7. What is diaphragm? (A-2013)
8. What is meant by Inspiration and Expiration? (A-2013)
9. Enlist the properties of respiratory surfaces in animals. (A-2013)
10. Write down three important factors, which affect the capacity of haemoglobin to combine with oxygen. (A-2013)

Answers

1. **Structural difference between Hemoglobin and Myoglobin: -**

| Hemoglobin | Myoglobin |
|--|---|
| 1. It is globular protein which has four polypeptide chains coiled around one another. | 1. It is a small protein composed of just one polypeptide chain with eight helices. |
| 2. It has an iron containing heme group tht binds oxygen. | 2. It has an iron containing hemeprosthetic group that binds oxygen. |

2. **The Types of Respiration in Frog: -**

Frog has following three types of respiration:

1. **Pulmonary Respiration** The exchange of gases through lungs
2. **Cutaneous Respiration** The exchange of gases by moist and highly vascularized thin skin
3. **Buccal Respiration** The gaseous exchange through thin vascularized lining of the buccal cavity.

3. **Differences between Photorespiration and Cellular Respiration: -**

| Photrespiration | Cellular Respiration |
|---|---|
| 1. It takes place only in plants. | 1. It takes place in animals as well as in plants. |
| 2. It takes place only in day which is hot and dry. | 2. It takes place all the times. |
| 3. It requires energy. | 3. It releases energy. |
| 4. It is light independent rection just like Clavin Cycle and uses ATP and NADPH produced in the light reaction of photosynthesis but it is reverse of Calvin Cycle in which oxygen is fixed instead of carbon dioxide which is released outside the plant. | 4. It is a catabolic reaction but not an anbolic reaction just like photosynthesis. |

4. **Asthma: -**
See Dera Ghazi Nhan Board Answer No: 13

5. **Air as best Respiratory Medium than Water: -**
See Multan Board Answer No: 3

6. **Differences between Composition of Inhaled and Exhaled Air: -**

| Composition of Inhaled Air | Composition of Exhaled Air |
|-----------------------------------|-----------------------------------|
| 1. Oxygen 21 % | 1. Oxygen 16 % |
| 2. Carbon dioxide 0.04 % | 2. Carbon dioxide 4 % |
| 3. Water vapors Variable | 3. Water vapors Variable |
| 4. Nitrogen 79 % | 4. Nitrogen 79 % |

7. **Diaphragm: -**
See Lahore Board Answer No: 10 (A)

8. **A) Inspiration**
It is the process of taking in of air from atmosphere upto lungs.
B) Expiration: -
See Gujranwala Board Answer No: 3

9. **Properties of Respiratory Surfaces in Animals: -**
See Multan Board Answer No: 2

10. **Three Important Factors Affect the Capacity of Haemoglobin to combine with Oxygen: -**

1. Rise in temperature causes a decrease in the oxygen-carrying capacity of blood, e.g.,
In the increased muscular activity.
2. Increased carbon dioxide tension decreases the capacity of hemoglobin to hold

oxygen and hence favors greater liberation of oxygen from the blood in tissues.

3. A decrease in blood pH results in a decreased ability of hemoglobin to bind oxygen and vice versa.

Sargodha Board Questions

1. Give function of Carbonic Anhydrase. (A-2010)
2. Define Photorespiration. (A-2010)
3. What is Myoglobin? (A-2010)
4. Describe the Causes of Asthma Disease. (A-2010)
5. What are Pleura? (A-2011)
6. How does Carbon Dioxide affect the Oxygen carrying capacity of Hemoglobin? (A-2011)
7. Define the Residual Volume of Lung. What is Residual Volume of Lung in Man? (A-2011)
8. Write Gaseous Exchange in Plants. (A-2012)
9. What do you know about Pleura and Alveoli? (A-2012)
10. What is Photorespiration? (A-2012)
11. Define Ventilation and Respiration. (A-2012)
12. What are spiracles? Give their function. (A-2013)
13. What is emphysema? (A-2013)
14. What is vocal cord? Give its functions. (A-2013)
15. How exchange of gases takes place in *Hydra*? (A-2013)

Answers

1. **Function of Carbonic Anhydrase: -**
Carbonic Anhydrase, present in RBC, catalyses the combination of hemoglobin with oxygen to form bright red unstable compound Oxyhemoglobin in the capillaries of lungs where oxygen tension is very high
2. **Photorespiration: -**
See Multan Board Answer No: 7
3. **Myoglobin: -**
Myoglobin, also known as muscle hemoglobin, is a hemoglobin like iron containing protein in skeletal and cardiac muscles consisting of just one polypeptide chain along with heme prosthetic group which stores oxygen in tissues.
4. **The Causes of Asthma Disease: -**
See Lahore Board Answer No: 17
5. **Pleura: -**
See Lahore Board Answer No: 4
6. **The effect of Carbon Dioxide on the Oxygen carrying capacity of Hemoglobin:**
Increase in Carbon Dioxide pressure decreases the Oxygen carrying capacity of

Hemoglobin. In this way increased carbon dioxide tension favors the greater liberation of oxygen from blood to the tissues.

7. A) Residual Volume of Lung:

1. Residual Volume of Lung is the volume of air that remained in the lungs after maximum volume of air is inspired and expired.
2. It remains in there due to the fact that thoracic cavity can not collapse completely.
3. It is not stagnant since inspired air mixes with it at each time.

B) Residual Volume of Lung in Man: -

There is a residual volume of 1.5 litres in man even during exercise which can not be expelled.

8. Gaseous Exchange in Plants: -

1. All plants exchange gases for respiration as well as photosynthesis. The process of respiration occurs constantly day and night in all living cells of plants. However, photosynthesis occurs during day time and in chlorophyll containing cells.
2. Stomata present in lower epidermis of leaves and young stems are the main sites of gaseous exchange in land plants.
3. Lenticels are the special pores in the dead cork tissues of older and woody stems which are involved in gaseous exchange.
4. Gaseous exchange also occurs in roots and root hair by diffusion through epidermal cells from air existing in the spaces between soil particles.
5. Aquatic plants obtain their oxygen by diffusion from dissolved oxygen in water.

9. A) Pleura:

Pleura or pleural membranes are two thin membranes which enclose each lung and within which there is fluid filled cavity known as pleural cavity. Fluid in the pleural cavity acts as a lubricant.

B) Alveoli: -

Alveoli are tiny, blind end sacs with single layered wall of epithelial cells in the lungs which are surrounded by a capillary network are the sites of gaseous exchange between air and blood.

10. Photorespiration: -

See Multan Board Answer No: 7

11. A) Ventilation:

It is the inflow or outflow of air or water between the environment and lungs or gills.

Or

It is the process of taking in and giving out of air or water from atmosphere up to respiratory surface (lung or gill) and vice versa.

B) Respiration: -

Respiration is the break down of macromolecules into simpler units to release energy in the form of ATP for vital activities. Or
Any biochemical process in which energy is released is called Respiration.

12. **A) Spiracles: -**
See Lahore Board Answer No: 3
B) Function: -
They aid in inhalation and exhalation of gases in insects (Cockroach).
13. **Emphysema: -**
See Faislabad Board Answer No: 2
14. **A) Vocal Cords: -**
They are two thin edged fibrous bands which are formed by stretching of mucous membrane of glottis.
B) Function of Vocal Cords: -
They help in voice production, when vibrated by air.
15. **Exchange of Gases in Hydra: -**
1. In *Hydra* exchange of gases occurs through the entire general surface in contact with water.
2. It also occurs in cells lining the digestive tract.

Faislabad Board Questions

1. What is Photorespiration? (A-2007)
2. What is Emphysema? (A-2008)
3. What do you know about Respiratory Distress Syndrome? (A-2008)
4. What is Pulmonary Respiration? (A-2009)
5. Name some Respiratory Disorders. (A-2009)
6. Write Two Properties of Respiratory Surface in Animals. (A-2010)
7. What is Emphysema? (A-2010)
8. Give Percentage of CO₂ in Normal Venous and Arterial Blood. (A-2010)
9. Differentiate between Organismic Respiration and Cellular Respiration. (A-2011)
10. Point out the location and function of Vocal Cords in Human. (A-2011)
11. What is Myoglobin? State its any one function. (A-2011)
12. Define Parabronchi. (A-2012)
13. Explain Spiracles in Cockroach. (A-2012)
14. Give the composition of inhaled and exhaled air in man. (A-2013)
15. Define cellular respiration. (A-2013)
16. Give two roles of myoglobin in muscles. (A-2013)
17. Name the body structures involved for gaseous exchange in frog. (A-2013)

Answers

1. **Photorespiration: -**
See Multan Board Answer No: 7
2. **Emphysema: -**
The term emphysema literally means excess air in the lungs. However, when one speaks of chronic pulmonary emphysema, it is a permanent increase in the air sacs with destructive changes in their walls, even bursting of walls, combinations of smaller

ruptured alveoli to form larger alveoli, obstruction of many airways due to inflammatory

reactions in the bronchioles leading to reduction in the ability of lungs to oxygenate the

blood and remove CO₂, hence entrapment of air in the alveoli.

Or

It is a chronic lung disorder in which alveoli are distended and their walls are damaged so

that surface area for available gas exchange is reduced. It is often preceded by chronic

bronchitis (i.e. inflammation of bronchioles). Air trapped in the lungs lead to alveolar

damage and noticeable blooming of the chest.

3. Respiratory Distress Syndrome: -

See Multan Board Answer No: 22

4. Pulmonary Respiration: -

It is the exchange of gases through lungs. Lung are the structures in terrestrial vertebrates

which are involved in respiration called Pulmonary Respiration. Air passages of all lungs

terminate into air tubes or air chambers or sacs richly supplied with blood capillaries

where exchange of gases occurs.

5. Respiratory Disorders: -

Dera Ghazi Khan Board Answer No: 11

6. Two Properties of Respiratory Surface in Animals: -

See Bahawalpur Board Answer No: 9

7. Emphysema: -

See Faislabad Board Answer No: 2

8. Percentage of CO₂ in Normal Venous and Arterial Blood: -

9. Difference between Organismic Respiration and Cellular Respiration: -

See Multan Board Answer No: 16

10. A) Location of Vocal Cords in Human:

They are located in the glottis in human.

B) Function of Vocal Cords in Human: -

They help in voice production, when vibrated by air.

11. Myoglobin and its function: -

See Multan Board Answer No: 10

12. Parabronchi: -

See Multan Board Answer No: 6

13. Spiracles in Cockroach: -

Spiracles are the apertures present in the sides of the body of Cockroach which communicate with main tracheal trunk of Tracheal System. There are ten pairs of spiracles

on lateral sides of Cockroach; first two pairs lie in the thorax while the rest eight are in

each of the eight abdominal segments. Exhalation and inhalation in Cockroach takes place

at the same in different regions of the body through spiracles. Inspiration takes place through first four pairs of spiracles while expiration occurs through posterior six pairs of spiracles.

14. Composition of Inhaled and Exhaled Air in Man: -

| | Inhaled % | Exhaled % |
|----------------|-----------|-----------|
| Oxygen | 21 | 16 |
| Carbon dioxide | 0.04 | 4 |
| Water vapors | Variable | Saturated |
| Nitrogen | 79 | 79 |

15. Cellular Respiration: -

See Bahawalpur Board Answer No: 1

16. Two Roles of Myoglobin in Muscles: -

1. It stores some oxygen.
2. It serves as an intermediate compound for the transfer of oxygen from hemoglobin To aerobic metabolic processes of muscle cells.

17. Names of the Body Structures involved for Gaseous Exchange in frog:-

1. Skin
2. Buccal Cavity
3. Lungs

Chapter No: 14 2 SQs
Multan Board

Questions

1. What controls the Movement of K⁺ into and out of Guard Cells? (A-2007)
2. How do Humidity and Vapour Pressure affect rate of Transpiration? (A-2007)
3. What is the Role of Capillaries in Blood Circulation and Transportation? (A-2007)
4. Define Active Immunity and Passive Immunity. (S-2007)
5. What is Plasmolysis? (Model Paper-2006-08)
6. What are the Characteristics of Circulatory System of a Multicellular Animal? (Model Paper-2006-08)
7. Compare Monocytes with Lymphocytes. (Model Paper-2006-08)
8. What is Electrocardiogram? (Model Paper-2006-08)
9. What is the function of Tricuspid Valve? (A-2008)
10. What are Macrophages? (A-2008)
11. Differentiate between Antigens and Antibodies. (A-2008)
12. What is Apoplast Pathway? (A-2008)
13. What is Plasmolysis? (S-2008)
14. What is Transpiration? (S-2008)
15. What do you mean by Hypertension? (S-2008)
16. What is Haemorrhage? (S-2008)
17. Define Imbibition. (A-2009)
18. Give the Pathway of Blood in Single Circuit Heart. (A-2009)
19. How does Carbon Dioxide concentration affect the rate of Transpiration? (A-2009)
20. Define Guttation. (S-2009)
21. What is Stomata and write its Functions? (S-2009)
22. Define Blood Pressure. (S-2009)

23. Differentiate between Active and Passive Immunity. (S-2009)
24. Name Four Parts of Heart of Fishes. (A-2010)
25. What is the Importance of Transpiration? (A-2010)
26. Compare Endosmosis with Exosmosis. (S-2010)
27. What are Blue Babies? (S-2010)
28. What is Imbibition? Write its significance for the germinating seed. (A-2011)
29. Differentiate between Passive and Active Immunity. (A-2011)
30. What is Pace Maker? Write its function. (A-2011)
31. Compare Open Circulatory System with Closed Circulatory System. (A-2011)
32. What is Pericardium? Write its functions. (S-2011)
33. What do you know Blue Babies? (S-2011)
34. Differentiate between Systolic and Diastolic Blood Pressure. (S-2011)
35. What is E.C.G? Write its Importance? (S-2011)
36. What is Electrocardiogram or ECG? State its use. (A-2012)
37. Compare Cell Mediated Response with Humoral Immune Response. (A-2012)
38. What is the difference between Guttation and Bleeding? (A-2012)
39. Differentiate between Pulmonary and Systemic Circulation. (A-2012)
40. What is meant by Hypertension? (A-2013-New)
41. What is Facilitated Diffusion? (A-2013-New)
42. What is the function of Eosinophils? (A-2013-Old)
43. Define the function of Basophils. (A-2013-Old)
44. What is the role of Platelets in blood? (A-2013-Old)

Answers

1. Control of the Movement of K⁺ into and out of Guard Cells: -

1. Level of carbon dioxide in the spaces inside the leaf controls the movement of K⁺ ions into and out of Guard Cells. A low level of carbon dioxide in the leaf favors the movement of K⁺ ions from epidermal cells into guard cells, hence opening of stomata.
2. Blue light falling on leaves, that acidifies the environment of the guard cells, also favors the movement of K⁺ ions from epidermal cells into guard cells, hence opening of stomata.

2. Humidity and Vapour Pressure affecting rate of Transpiration: -

- In dry air rate of diffusion of water from the surfaces of mesophyll cells, air spaces, and through stomata to outside the leaf is increased, hence increasing the rate of transpiration.
- In humid air the diffusion rate is reduced. This decreases the rate of transpiration appreciably.

3. Role of Capillaries in Blood Circulation and Transportation: -

1. Capillary has dense network in tissues so that every cell is in direct contact with capillary. Water and dissolved substances in the blood pass in and out exchanging oxygen, carbon dioxide, dissolved food and excretory products with the tissues and capillaries.
2. Capillary has pre capillary sphincters that regulate the amount of blood flowing in capillaries. Thus the amount blood flowing in a certain tissue is controlled.

3. Capillary diameter can be altered controlling the amount of blood flowing in a certain tissue. Capillary tends to close by nervous stimulation and dilate by chemicals such as Histamine.

4. **A) Active Immunity:**
It is immunity to disease based on prior exposure to an antigenic pathogen either naturally or artificially in which antibodies or sensitized T-lymphocytes are produced by the person that recognize foreign antigen, react specifically with it to bring about its destruction or inactivation. Or Active immunity develops in the form of production of antibodies or T-lymphocytes as a result of exposure to antigens which can occur naturally after recovery from a disease or can be artificially induced by immunization with a vaccine.

B) Passive Immunity: -
It develops when antibodies or activated T-lymphocytes enter the body from an outside source to make a person immune against a disease. It is either natural as in the transfer of antibodies from mother to fetus across placenta or artificial by inoculation of antiserum containing antibodies or lymphocytes formed in another person.

5. **Plasmolysis: -**
Plasmolysis can be defined as the shrinkage of protoplast due to exosmosis of water. Or It is a process in which cytoplasm begins to separate from cell wall leaving a noticeable gap between cell wall and cell membrane due to exosmosis of water. Plasmolysis occurs in plants when the soil or water around them contains high concentration of salts or fertilizers.

6. **Characteristics of Circulatory System of a Multicellular Animal: -**
Characteristics of circulatory system of a multicellular animal are as follows:
1. Circulatory System has circulatory fluid, the blood.
2. The blood is pumped by a contractile device around the body which may be modified blood vessel or a heart.
3. The blood circulates through the tubes which are known as blood vessels.
4. It has one way valves to keep the medium flowing in one direction.

7. **Comparison of Monocyte with Lymphocytes: -**

| Monocytes | Lymphocytes |
|--|---|
| 1. They are granulocytes. | 1. They are granulocytes. |
| 2. They are two to three times larger than red blood cells. | 2. They are slightly larger than red blood cells. |
| 3. They have large round nucleus that nearly fills the cell. | 3. They have round to lobed nucleus. |
| 4. They are about 3 % of white blood cells. | 4. They are about 32 % of white blood cells. |
| 5. Their life span in the blood is 10- | 5. They have life spans of months or even years according |

| | |
|---|---|
| <p>20 hours after which they enter tissues and become macrophages.</p> <p>6. They give rise to macrophages which destroy large particles by phagocytosis.</p> | <p>to the body needs for these cells.</p> <p>6. There are two types of lymphocytes, B lymphocyte and T lymphocytes. B lymphocytes give rise antibodies involved in active and passive immunity and humoral responses.</p> |
|---|---|

8. Electrocardiogram or ECG: -
 Electrocardiogram (ECG) is a graph showing electric potentials produced by cardiac impulses which is recorded when electrodes of electrocardiograph (ECG) machine are placed on the skin on the opposite sides of the heart as electric currents produced by heart flow into tissues surrounding the heart and onto body surface.

9. Function of Tricuspid Valve: -
 It prevents the backward flow of blood from right ventricle to right atrium during ventricular systole and allows the blood to enter from right atrium to right ventricle during auricular systole.

10. Macrophages: -
 Macrophages are mononuclear cells that originate from monocytes in the tissues that destroy larger particles by phagocytosis.

Or

1. Macrophages are mononuclear (having single non-lobed nucleus) phagocytic cells that originate from bone marrow precursor cells.

2. After differentiating and maturing in the bone marrow they are released into blood where they circulate as monocytes for about 10-20 hours before entering the tissues and becoming tissue macrophages.

3. Macrophages live for several months forming body’s mononuclear phagocytic immune response (formerly referred to as the reticuloendothelial system).

4. They are found free in the blood, free or fixed in the tissues of lymph nodes or spleen, fixed in the liver (Kupffer cells), on the pleural and peritoneal membranes and in the alveoli of lungs.

11. Differences between Antigens and Antibodies: -

| Antigens | Antibodies |
|--|---|
| <p>1. They are foreign substances that elicit an immune response by inducing antibody formation and are destroyed by these antibodies.</p> | <p>1. They are substances that are produced by the body itself or produced in another person and inoculated in the body which destroy antigens that</p> |

| | |
|---|---|
| <p>2. Antigens are also known as immunogens.</p> <p>3. The most familiar antigens are infectious agents such as bacteria, fungi, protozoa such as malarial parasites and helminthes but other substances also act as antigens. Most of them are of protein nature but complex molecules such as large carbohydrate molecules, lipoprotein and lipopolysaccharides will induce antibody formation.</p> | <p>stimulate their production.</p> <p>2. They are also known as immunoglobins.</p> <p>3. They are globulin proteins that are synthesized by plasma cells derived from B lymphocytes in response to antigenic stimulation.</p> |
|---|---|

- 12. Apoplast Pathway: -**
 It is the pathway involving system of adjacent cell walls which is continuous through out the plant roots. In the roots apoplast pathway becomes discontinuous in the endoderms due to presence of casparian strips. Or
 The movement of soil solution through extracellular pathway provided by continuous matrix of cell walls is known as Apoplast pathway.
 It becomes discontinuous in the endodermis of roots due to presence of casparian strips.
- Or
 It is a pathway consisting of the interconnected porous plant cell walls along which water moves freely. Casparian strips in the walls of endodermis block the apoplast pathway.
- 13. Plasmolysis: -**
 See Mutan Board Answer No: 5
- 14. Transpiration: -**
 Transpiration is the loss of water from aerial surfaces of a plant (i.e. leaves and stem) through evaporation. Or
 The evaporation of water from the aerial parts of the plant especially through stomata of leaves is called Transpiration.
- 15. Hypertension: -**
 1. It is commonly known as High Blood Pressure.
 3. It is a disorder with sustained diastolic pressures of 90 mmHg and above and systolic pressures of 135 and above (normal blood pressure is 115/70 mm Hg).
 4. It promotes artherosclerosis.

5. Due to prolonged high blood pressure, heart muscles become weak and thickened and heart may enlarge and fail to pump blood effectively. Blood may then be retained in the heart and lungs, often leading to fatal condition called congestive heart failure.

16. Hemorrhage: -

1. It is the discharge of blood from blood vessels.
Or
Hemorrhage is defined as the escape of the blood from blood vessels.
2. The hemorrhage may occur any where in the body. But the most dangerous is the brain hemorrhage causing stroke which occurs due to bursting of any of the artery supplying the brain. Hardening of arteries, loss of elasticity of arteries and high blood pressures are the cause of hemorrhage.
3. To avoid hemorrhage blood pressure must be controlled between normal limits.

17. Imbibition: -

1. Absorption of water and swelling of hydrophilic (water loving) substances is known as Imbibition.
2. The cell wall components especially cellulose, pectin and lignin take up water and as a result increase in volume, but the components do not dissolve in water.
3. The root cell walls imbibe water from the soil which moves by apoplast pathway.
4. The absorption of water by a seed prior to germination is an example of imbibition.
The volume of dry seed may increase upto 200 times by imbibition, as result the seed coat ruptures and makes the germination of seed effective.
5. It is a reverse process and when water is lost, the original volume of cell wall and of protoplasm is restored.

18. Pathway of Blood in Single Circuit Heart: -

Pathway of Blood in Single Circuit Heart (as of Fishes) is:

Sinus Venosus --→ Atrium --→ Ventricle --→ Conus Arteriosus --→ Ventral Aorta --→ Gills --→ Dorsal Aorta --→ Body --→ Sinus Venosus

19. Carbon Dioxide concentration affecting the rate of Transpiration: -

1. Low carbon dioxide concentration in the leaves during the day, when all amount of CO₂ is used in the photosynthesis, stimulates the active transport of K⁺ ions into the guard cells which causes opening of stomata, diffusion of CO₂ through stomata into the mesophyll cells of leaves and transpiration of water through stomata.
2. High concentration of CO₂ in leaves at night, due to cellular respiration in the absence of photosynthesis, halts the inward transport of K⁺ and thus water allowing the guard cells to become flaccid and stomata close. Thus transpiration almost stops.

20. **Guttation: -**

1. It is the appearance of water droplets on leaves forced out through leaf pores by root pressure.
Or
The exudation of liquid water from leaves due to root pressure through openings, the hydathodes, is called Guttation.
2. Guttation does not take place through stomata, but instead occurs through special group of cells located near the ends of small veins that form openings called hydathodes.
3. Guttation occurs when transpiration is negligible and available soil moisture is high.
4. It typically occurs at night because stomata are closed, but water continues to move into the roots by osmosis.
5. The guttation is in fact due to positive pressure-the root pressure, developed in the xylem tissue of roots.

21. **A) Stomata:**

1. Stomata are microscopic pores present in the epidermis of leaves and herbaceous stems.
2. Each stoma is boarded by two modified kidney shaped epidermal cells called guard cells which unlike epidermal cells are provided with chloroplasts.
3. In general the stomata remain open during day time and become close at night.
Thus light appears to be the prime factor which initiates opening of stomata.

B) Functions of Stomata:

1. Stomata are the sites where main transpiration occurs.
2. CO₂ for photosynthesis enteres the leaves through stomata.
3. Oxygen produced during photosynthesis diffuses out of the leaves through stomata.
4. CO₂ produced during cellular respiration diffuse out of leaves through stomata.

22. **Blood Pressure: -**

1. It is the measure of force with which blood pushes up against the walls of blood vessels.
Or
Blood Pressure is the hydrostatic force exerted by the blood against unit area of the blood vessel wall.
Or
The force exerted by blood against the inner walls of the blood vessels is called Blood Pressure.
2. It is measured in millimeters of mercury (mmHg).
3. Mercury manometers called sphagmomnometer are usually used for measuring the blood pressure.
4. The normal blood pressure in the large arteries of healthy young adult at the level of the heart is normally about 115/70 mmHg.

5. Blood pressure is generated by the contraction of ventricles (ventricle systole) and is the highest in aorta and then gradually reduces in arteries due to elasticity of arteries and friction between flowing blood and walls of blood vessels.

23. Differences between Active and Passive Immunity: -

| Active Immunity | Passive Immunity |
|--|---|
| 1. Individuals synthesize their own antibodies. | 1. Individuals get prepared antibodies from outside source. |
| 2. It provides protection for long period of time. | 2. It is short lived. |
| 3. It takes time in developing. | 3. It provides immediate protection. |

24. Four Parts of Heart of Fishes: -

- 1. Sinus Venosus
- 2. Atrium
- 3. Ventricle
- 4. Conus rteriosus

25. Importance of Transpiration: -

- 1. It creates pulling force called Transpiration Pull for the conduction of water and salts from roots to aerial parts of plants.
- 2. It leaves a cooling effect on plants.
- 3. It provides wet environment to the cells of leaves where gaseous exchange occurs.
- 4. Minerals dissolved in water are distributed throughout plant body by transpiration pull.

26. Comparison of Endosmosis with Exosmosis: -

| Endosmosis | Exosmosis |
|---|---|
| 1. Water enters into the cell. | 1. Water leaves the cell. |
| 2. Cell becomes turgid due to endosmosis. | 2. Cell loses turgidity and its cytoplasm shrink due to exosmsis. |
| 3. Endosmosis takes place when cell is placed in hypotonic environment. | 3. Exosmosis takes place when cell is placed in hypertonic environment. |

27. Blue Babies: -

- 1. The term, blue babies (a lay man terminology), is usually applied for new born babies with cyanosis (slow venous blood flow and the rise in the blood volume greatly increase the amount of reduced hemoglobin in the distended venules, thus causing general blue color of the skin).
- 2. The most common cause of cynosis is cyanotic congenital heart disease.
- 3. Cynotic congenital heart disease is caused by mixing of oxygenated and deoxygenated blood between two atria due to failure of interarterial foramen (an opening in the inter arterial septum) to close or of ductus arteriosus to fully

constrict.

28. A) Imbibition:
Absorption of water and swelling of hydrophilic (water loving) substances is known as Imbibition.

B) Significance of imbibition for the germinating seed: -
The uptake of water by imbibition is especially important in germinating seeds. The result the seed coat ruptures and makes the germination of seed effective.

29. Difference between Passive and Active Immunity: -
See Multan Board Answer No: 23

30. A) Pace Maker: -
Pace maker is a device which consists of a small electronic device and power connected to heart via an electric wire and is implanted beneath the skin in the chest attached to ventricle.

B) Function of Pace Maker: -
It supplies electric impulses to the heart to maintain the heart at regular rate.

31. Comparison of Open Circulatory System with Closed Circulatory System: -

| Open Circulatory System | Closed Circulatory System |
|---|---|
| <p>1. The blood does not remain enclosed in blood vessels and comes in direct contact with surrounding tissues and bathes them.</p> <p>2. It has no typical arteries, veins and capillaries and blood circulates in the cavities or sinuses. Blood is called hemolymph and the cavities or sinuses with blood are collectively known as hemocoel.</p> <p>3. Blood is pumped by a heart which propels it into blood vessels which open into sinuses from where it is driven back into the heart.</p> <p>4. Exchange of materials occurs between blood and tissues when blood directly bathes the</p> | <p>1. The blood circulates through closed blood vessels and does not come out at any place in direct contact with the surrounding tissues.</p> <p>2. It consists of interconnected system of arteries, veins and capillaries.</p> <p>3. Blood is pumped by the heart rapidly around the body under sustained high pressure and back to the heart.</p> <p>4. Exchange of materials occurs across the walls of blood capillaries between the blood and tissues via tissue fluid.</p> <p>5. It also transport gases i.e.</p> |

| | |
|---|---|
| tissues. 5. It does not transport gases which are transported by Tracheal System. Example: Cockroach | oxygen and carbon dioxide. Example: Eathworm |
|---|---|

32. **A) Pericardium:**
Pericardium is a double membraneous sac enclosing the heart which contains pericardial fluid within the pericardial cavity between the membranes.
- B) Functions of Pericardium: -**
1. It functions as lubricant and reduces friction between the heart walls and surrounding tissue during the beating of heart.
2. Pericardium prevents heart from over extension.
33. **Blue Babies: -**
See Multan Board Answer No: 27

34. **Difference between Systolic and Diastolic Blood Pressure: -**

| Systolic Blood Pressure | Diastolic Blood Pressure |
|--|---|
| 1. It is the force exerted by blood on the walls of arteries when ventricles contract. | 1. It is the blood pressure on the walls of arteries when ventricles relax. |
| 2. Systolic blood pressure in normal individuals is 120 mmHg. | 2. Diastolic pressure in normal individuals ranges between 75-85 mmHg. |

35. **A) E.C.G or Electrocardiogram:**
Heart chambers contract by nerve impulse. As each wave of contraction spreads through the heart, electric currents flow into the tissues surrounding the heart and onto the body surface. By placing electrodes on body surface on opposite sides of the heart, electric activity can be amplified and recorded by an electrocordigraoph. The graph produced is called an electrocardiogram or ECG or EKG.
- B) Importance: -**
It helps to diagnose the abnormalities in the rithymicity and conduction system of the heart.

37. **Comparison Cell Mediated Response with Humoral Immune Response: -**

| Cell Mediated Response | Humoral Response |
|--|---|
| 1. It is the immune response in which manifestation is through macrophages with no intervention of antibody. | 1. It is the immune response in which andibodies are the principal effectors. |
| 2. T lymphocyte cells direct | 2. B lymphocyte cells direct |

| | |
|--|---|
| <p>the cell mediated response.</p> <p>3. After their origin in the bone marrow, T cells migrate to Thymus where they develop the ability to directly attack body cells infected by pathogens, foreign cells such as those introduced in tissue grafts or organ transplants and cancer cells.</p> | <p>the humoral response.</p> <p>3. Unlike T cells B cells do not travel to the thymus, they complete their maturation in the bone marrow. From the bone marrow B cells are released to circulate in the blood and lymph where they differentiate into plasma cells and memory cells. Each plasma cell is a miniature factory producing antibodies that bind with foreignn antigens leading the destruction of pathogen.</p> |
|--|---|

38. Differences between Guttation and Bleeding: -

| Guttation | Bleeding |
|---|--|
| <p>1. It is exudation of liquid water from plants.</p> <p>2. It takes place through water secreting glands or hydathodes.</p> <p>3. It takes place at night when transpiration is suppressed.</p> <p>4. In guttation small quantity of water is lost in the form of guttation droplets.</p> <p>5. Only root pressure in xylem tissue of roots is responsible for guttation.</p> <p>6. Guttation droplets are seen on the tips of grass leaves or strawberry leaves.</p> | <p>1. It is flow of sap from the plant when it is cut, pruned, tapped or otherwise wounded.</p> <p>2. It occurs from cut ends or surfaces of plants.</p> <p>3. It takes place when plant is cut, pruned, tapped or otherwise wounded.</p> <p>4. In bleeding considerable quantity of sap upto the extent of 10-15 liters per day comes out with considerable force.</p> <p>5. There are two main factors responsible for bleeding i.e. hydrostatic pressure in the xylem and phloem elements and root pressure.</p> <p>6. Bleeding is often seen in many land plants in the spring, particularly grape wine, some palms,</p> |

| | |
|--|---------------------|
| | sugar maple etc. |
|--|---------------------|

39. Differences between Pulmonary and Systemic Circulation: -

| Pulmonary Circulation | Systemic Circulation |
|--|--|
| 1. It is the part of circulatory system which delivers blood to and from the lungs for oxygenation. 2. Pulmonary circulation connects the heart and lungs. 3. Blood flows through the pulmonary circulation in the following sequence: Right atrium→ Right ventricle→ Pulmonary arteries→Pulmonary capillaries (in lungs)→ Pulmonary veins→ Left atrium | 1. It is the part of circulatory system that delivers blood to and from the tissues and organs of the body. 2. Systemic Circulation connects the heart with all body tissues. 3. Blood flows through systemic circulation in the following sequence: Left atrium→ Left Ventricle→ Aorta→ Arteries in body tissues→ Arterioles in body tissues→ Capillaries in body tissues→Venules in body tissues→ Veins in body tissues→Vena cava→Left atrium |

40. Hypertension: -
See Multan Board Answer No: 15

41. Facilitated Diffusion: -
It is the passive transport of ions or molecules by a specific carrier protein in membrane.
As in simple diffusion, net transport is down a concentration gradient and no additional energy has to be supplied. Or
It is a protein carrier associated diffusion of molecules across a cellular membrane through specific channels from a region of higher concentration to one of lower concentration. The process is driven by the concentration gradient and does not require cellular energy from ATP. Or
1. The movement of the ions or large molecules in and out of the membrane through intrinsic protein is called Facilitated Diffusion.
2. It does not require input of cell's metabolic energy (ATP) and takes place down the concentration gradient.
3. The proteins in facilitated diffusion is membrane transport proteins such as channel proteins and carrier proteins which are highly selective like enzymes and combine with certain molecules or ions and transport them across the membrane.

4. The shape of channel protein molecule is such that it forms water filled pore in the membrane which facilitates passage of water soluble substances.

42. Functions of Eosinophils: -

1. They function in detoxifying foreign proteins and other substances.
2. They release enzymes used in fighting parasites and destroying allergens.

Or

1. They inactivate inflammation-producing substances.
2. They attack parasites.

43. Functions of Basophils: -

2. They release histamine in injured tissues and in allergic responses which dilate blood

vessels and make capillaries more permeable and promote blood flow to injured tissues

3. They contain heparin, an anticoagulant that helps prevent blood from clotting

inappropriately within the blood vessels. Or

1. They produce histamine which causes inflammation.
2. They release heparin to prevent blood clot.

44. Role of Platelets in Blood: -

Platelets play an important role in blood clotting. When, a blood vessel is broken, smooth

muscles in the vessel walls contract, causing the vessel to constrict. Platelets then accumulate

at the injured site and form a plug by sticking to each other and to the surrounding tissues.

Platelets also help in conversion of fibrinogen, a soluble protein in the plasma, into insoluble

form, fibrin. This reaction is catalyzed by the enzyme thrombin which is formed from an

inactive enzyme called prothrombin. Once formed fibrin produce long threads that stick to the

damaged surface of the blood vessel and form the webbing of the clot. These threads trap

blood cells and platelets, which help strengthen the clot.

Bahawalpur Board

Questions

1. What is Vacuolar Pathway? (A-2007)
2. Define Cohesion Tension Theory. (A-2007)
3. What is Cuticular Transpiration? (A-2007)
4. What is the role of K^+ ion in the Opening of Stomata? (A-2007)
5. What do you know about Vacuolar path way? Explain. (A-2008)
6. Differentiate between Cohesion and Adhesion. (A-2008)
7. What are Hydathodes? Where are they situated? (A-2008)
8. What are Platelets? Give their role. (A-2008)
9. Differentiate between Antigens and Antibodies. (A-2009)
10. Differentiate between Guttation and Bleeding. (A-2009)
11. Differentiate between Artery and Vein. (A-2009)
12. Give the role of Platelets. (A-2010)
13. Write difference between Guttation and Bleeding. (A-2010)
14. What are different types of Transpiration? (A-2010)
15. Distinguish between Pulmonary Circulation and Systemic Circulation. (A-2011)
16. Distinguish between Cavum Venosum and Cavum Pulamule. (A-2011)

17. Distinguish between Symplast and Apoplast Pathway for Transport of Water. (A-2011)
18. How mineral ions are transported into root cells whose concentration is already high in root cells. (A-2011)
19. Define Source and Sink. (A-2013)
20. Give the equation of Water Potential. (A-2013)

Answers

1. **Vacoular Pathway: -**

In this pathway water moves from vacuole to vacuole through neighbouring cells crossing the symplast and apoplast in the process and moving through cell membranes by osmosis.

Or

It is the pathway in which water enters the root hair or epidermal cells down a gradient of water potential and flows out of one cell across the cell wall, cell membranes and vacuolar membrane and enters the adjacent cell which may again take the same path to reach the next cell.

2. **Cohesion Tension Theory: -**

Cohesion Tension Theory explains that water is pulled up through the xylem due to

transpiration from the plant's leaves, the adhesion of water to plant vessel walls, and the cohesion of water molecules to each other rather than being pushed upwards due to root pressure..

Or

Cohesion Tension Theory states that by cohesion-tension of water molecules and the

transpiration pull providing the necessary energy sap (water and minerals) in xylem tissue

is pulled upward to the leaves upto 8 m h⁻¹.

Or

Cohesion-tension theory states that:

"The force which carries water (and dissolved materials) upward through xylem is

produced by pressure difference due to transpiration (that pulls water and salts up from

roots) and is called Transpiration Pull."

Or

Cohesion Tension Theory explains that water vapors transpire from the surface of leaf

mesophyll cells to the drier atmosphere through stomata. This produces a tension that

pulls water out of leaf xylem toward the mesophyll cells. The cohesion of water molecules

and adhesion of water molecules with vessels and tracheids of xylem allows unbroken

columns of water to be pulled up the narrow vessels and tracheids of stem xylem. This in

turn pulls water up root xylem, forming a continuous column of water from root xylem to

stem xylem to leaf xylem. As water moves upward in the root, it produces a pull that

causes soil water to diffuse into root.

3. **Cuticular Transpiration: -**

1. The loss of water in the form of water vapors through cuticle of leaves is called

-

-

Cuticular Transpiration. Or
Loss of water in vapor form from epidermal cells through cuticle is known as

Cuticular Transpiration.
2. Cuticle is a layer of waxy substance cutin found outside the epidermis of leaves and stems.

3. Cuticle is not completely impermeable to water and some water is lost in the form of vapors through it. Thinner the cuticle, greater is the rate of transpiration.

4. At night when the stomata are closed, cuticular transpiration takes place. About

5-7 % of total transpiration occurs through cuticle.

4. **Role of K⁺ ion in the Opening of Stomata: -**

Potassium ions move from epidermal cells into guard cells under the influence of light and low level of CO₂ in the leaf. Water follows these ions and enters guard cells which become turgid and stomata open.

5. **Vacuolar Pathway: -**

See Bahawalpur Board Answer No: 1

6. **Differences between Cohesion and Adhesion:**

| Cohesion | Adhesion |
|---|--|
| 1. It is the property of sticking together. Or It is the attraction among water molecules which hold water together. | 1. It is the property of sticking to some other substance. Or It is the attraction of water molecules to the walls of xylem cells. |
| 2. It is caused by hydrogen bonding. | 2. It is also result of hydrogen bonding. The composition of cell wall provides necessary adhesion to water molecules. |

7. **A) Hydathodes:**

They are openings of water secreting glands.

B) Location of Hydathodes:

Hydathodes are situated in special group of cells near the ends of small veins in leaves.

8. **A) Platelets:**

Platelets are the pieces of cytoplasm that are pinched off the megakaryocytes, large cells present in bone marrow. Or

Platelets are tiny spherical or disc-shaped bits of cytoplasm tha lack nuclei and that are pinched off from very large cells called megakaryocytes in the bone marrow. A platelet is not a whole cell but a fragment of cytoplasm enclosed by a membrane.

B) Role of Platelets:
 Platelets play an important role in blood clotting. They help in conversion of fibrinogen, a soluble protein, into insoluble form, fibrin. The fibrin threads enmesh red blood cells and other platelets in the area of damaged tissue, ultimately forming a blood clot. The clot serves as a temporary seal to prevent bleeding until the damaged tissue can be repaired.

9. Differences between Antigens and Antibodies: -
 See Multan Board Answer No: 11

10. Differences between Guttation and Bleeding: -
 See Multan Board Answer No: 38

11. Differences between Artery and Vein: -

| Artery | Vein |
|---|--|
| 1. It transports blood way from the heart to the various parts of the body through capillaries. | 1. It collects blood from body through capillaries and transports it towards heart. |
| 2. It usually carries oxygenated blood except pulmonary artery which has deoxygenated blood. | 2. It usually has deoxygenated blood except pulmonary vein which has oxygenated blood. |
| 3. It has smaller bore and thick walls. | 3. It has larger bore and thin walls. |
| 4. Its middle layer is thick and muscular with elastic fibers. | 4. Its middle layer is relatively thin and only slightly muscular with few elastic fibers. |
| 5. It has no valve. | 5. It has valves to prevent the back flow of blood. |

12. Role of Platelets: -
 See Bahawalput Board Answer No: 8 (B)

13. Difference between Guttation and Bleeding: -
 See Multan Board Answer No: 38

14. Different types of Transpiration: -
 There are three different types of transpiration depending upon the the route of escape of water vapors from the aerial parts of the plant.

1. Cuticular transpiration: -

Loss of water in the form of water vapors from epidermal cells through cuticle (a layer of waxy substance found outside the epidermis of leaves and stems) is called Cuticular Transpiration. About 5-7 % of total transpiration takes place through this route.

2. **Lenticular transpiration:** - It is the loss of water vapors through lenticels (aerating pores present in the bark of old woody plant).It occurs in some plants, not all. It is 1-2 % of total respiration by a plant.

3. **Stomatal Transpiration:** It is a type of transpiration in which water vapors escape through stomata. 90 % transpiration in plants is stomatal.

15. **Difference between Pulmonary Circulation and Systemic Circulation:** - See Multan Board Answer No: 39

16. **Differences between Cavum Venosum and Cavum Pulamule:** -

| Cavum Venosum | Cavum Pulamule |
|--|--|
| 1. It is a region on the left side of ventricle in all reptiles from which arise right and left systemic arches. | 1. It is a pocket on the right side of ventricle in all reptiles from which pulmonary tunk arises. |
| 2. It is a pocket into which left ventricle directs its oxygenated blood. | 2. Deoxygenated blood from right atrium is directed into this region. |

17. **Differences between Symplast and Apoplast Pathway for Transport of Water:** -

| Symplast Pathway | Apoplast Pathway |
|---|---|
| 1. In this pathway water flows directly through the plasma membranes and the protoplasts of the cells, passing from one cell to the next by way of the plasmodesmata. | 1. In this pathway water flows through cell walls. |
| 2. This pathway does not become discontinuous and water flows upto xylem through this pathway. | 2. This pathway becomes discontinuous in the endodermis due to casparian strips and then water must pass through the membrane and protoplast of endoderm cells before it can reach the xylem. |

18. **Transport of Mineral ions in Root cells:**

Mineral ions are transported into root cells whose concentration is already high in root cells by active transport. In this process molecules and ions move from their low concentration to their higher concentration through cell membrane by the use of energy in the form of ATP.

19. A) Source: -

1. Sources are the sites from where carbohydrates are released. Or Sources are the areas of carbohydrate supply.
2. Photosynthetic tissues such as mesophyll of the leaves are the main sources of carbohydrates.
3. Food storage tissues such as the cortex of roots of beet (biennial plant) can become source in the second growing season when they export stored sugars in growth of new shoots.

B) Sink: -

1. Sinks are the sites where carbohydrates are utilized. Or Sinks are the areas of active metabolism.
3. Food storage tissues such as cortex of roots of beet (biennial plant) can act as sink in first growing season when they utilize carbohydrate.
4. Recently formed leaves can be a sink, and they will receive sucrose until they begin to maximally photosynthesize.
5. Sink also occur at the growing tips of roots, stems and in developing tissues.

20. Equation of Water Potential: -

Dera Ghazi Khan Board Questions

1. Define Water Potential. Give its Components. (A-2008)
2. Differentiate between Open and Closed Circulatory System. Give an example in each case. (A-2008)
3. What is Atherosclerosis? How is it caused? (A-2008)
4. Differentiate Apoplast and Symplast Pathways briefly. (A-2008)
5. What is meant by Single Circuit Heart? (A-2009)
6. What do you know about Pressure Flow Theory? (A-2009)
7. Define Facilitated Diffusion. (A-2009)
8. What is Pacemaker? (A-2011)
9. Differentiate between Artery and Vein. (A-2011)
10. What is Blue Baby? (A-2011)
11. What is meant by Plasmolysis and Deplasmolysis? (A-2011)
12. Define Hypertension and Thrombo-Embolic. (A-2012)
13. Define Atherosclerosis. (A-2012)
14. Differentiate between Cell Mediated and Humoral Response. (A-2012)
15. Compare Monocytes with Lymphocytes. (A-2012)
16. Write a note on Bleeding. (A-2012)
17. Define Pulmonary and Systemic Circulation. (A-2012)
18. What are Blood Platelets? Give their Function. (A-2012)
19. What do you know about Active Immunity? (A-2012)

20. What is plasmolysis? What happens to the cell by its occurrence? (A-2013)
 21. Write down the symplast pathway of H_2O to reach xylem tissues. (A-2013)

Answers

- 1. A) Water Potential:**
 1. Water potential is defined as the free energy of water.
 2. The water potential of pure water is zero. The dissolved solutes lower the water potential to a negative number. Water moves from a region of higher (less negative) water potential to region of lower (more negative) water potential.
 4. Under normal conditions the water potential of the root is more negative than the water potential of the soil. Thus water moves by osmosis from the soil into the root.
- B) Components of water potential: -**
 There are two components to water potential:
 1. Physical forces such as a plant cell wall or gravity
 2. The concentration of solute in each solution
- 2. Difference between Open and Closed Circulatory System: -**
 See Multan Board Answer No: 31
- 3. A) Atherosclerosis:**
 It is a disease of the arterial wall which loses its elasticity, deposits hard yellow lipoid material and gradually becomes thick causing narrowing of artery and consequently impairing of blood flow. It leads to thrombus or embolus formation and consequently to heart attack. Or
 1. It is narrowing and hardening of arteries.
 2. It is the coexisting atheroma and arteriosclerosis.
 a. Atheroma is deposition of hard yellow plaque of lipoid material in the inner most layer of the arteries which may be due to high level of cholesterol in the blood.
 b. Arteriosclerosis is hardening of arteries due to degenerative areterial -
 - change, the risk of which increases with age.
 3. It leads to thrombus or embolus formation and hence to heart attack.
- B) Causes of Atherosclerosis:**
 The possible causes of atherosclerosis are smoking, hypertension, male gender, obesity, physical inactivity, a high serum cholesterol level, severe diabetes, increasing age, and family history of arterial disease.
- 4. Difference Apoplast and Symplast Pathways: -**
 See Bahawalpur Board Answer No: 19

5. Single Circuit Heart: -

The blood in heart of fishes flows in one direction only from sinus venosus to atrium then to ventricle and to ventral aorta, via bulbous arteriosus or conus arteriosus to gills and then to the body. It never receives oxygenated blood from gills for pumping. It receives deoxygenated blood from body through sinus venosus As the blood flows through the heart of fishes only once during each circuit of the body hence it is called Single Circuit Heart.

6. Pressure Flow Theory: -

Pressure Flow Theory states that the flow of solution in the sieve elements is driven by an

osmotically generated pressure gradient between source and sink. Or

Following steps explain the Pressure Flow Theory:

1. The glucose formed in the photosynthesizing cells is used within the cells and the rest is converted into sucrose.
2. Sucrose enters the sieve tubes in the smallest veinlets at the source. This is an energy-requiring step because active transport is needed
3. Then because of difference between the water potential in the sieve tubes and in nearby xylem cells water flows into the sieve tubes by osmosis.
4. Turgor pressure, in the sieve tubes, increases. The increased turgor pressure drives the fluid through out plant's system of sieve tubes.
5. At the sink carbohydrates are actively removed. Water moves from the sieve tubes by osmosis, and the turgor pressure there drops, causing a mass flow from the more positive pressure at the source to the more negative pressure at the sink.
6. Most of the water at the sink then diffuses back into the xylem, where it may either be recirculated or lost through transpiration.

7. Facilitated Diffusion: -

See Multan Board Answer No: 41

8. Pacemaker: -

See Multan Board Answer No: 30

9. Difference between Artery and Vein: -

See Bahawalpur Board Answer No: 11

10. Blue Baby: -

See Multan Board Answer No: 27

11. A) Plasmolysis:

Plasmolysis can be defined as the shrinkage of protoplast due to exosmosis of water.

Or

The withdrawal of protoplasm from cell wall due to exosmosis of water is known as-

Plasmolysis.

Or

from the
hypertonic
environment.

B) Deplasmolysis: -

Recovery of cell from plasmolysis due to endosmosis of water is called Deplasmolysis. Or
If the plasmolysed cell is placed in distilled water (which has highest potential) the water molecules would move from distilled water through differentially permeable membrane into the cell, and the cell would become deplasmolysed; the process is known as Deplasmolysis.

12. A) Hypertension:

It is a disorder with sustained diastolic pressures of 90 mmHg and above systolic pressures of 135 and above (normal blood pressure is 115/70 mm Hg).

Or

It is a condition of high blood pressure. It occurs when diastolic blood pressure is greater than 90 mmHg and the systolic pressure greater than 135-140 mmHg.

Or

It is a condition which occurs when the ventricles experience very strong contractions and either the systolic pressure is greater than 140 mmHg or the diastolic pressure is greater than 90 mmHg.

B) Thrombo-Embolism: -

Thrombus is a solid mass or plug of blood constituents (clot) in a blood vessel. This may block wholly or partially the vessel in which it forms or may be dislodged and carried to some other location in the circulatory system in which case it is called embolus. Formation of a thrombus and its dislocation to other site in the circulatory system as embolus is called Thrombo-Embolism. It is leading cause of deaths in western civilization.

13. Atherosclerosis: -

See Dera Ghazi Khan Board Answer No: 3

14. Differences between Cell Mediated and Humoral Response: -

See Multan Board Answer No: 37

15. Comparison of Monocytes with Lymphocytes: -

See Multan Board Answer No: 7

16. A note on Bleeding: -

1. It is flow of sap from the plant when it is cut, pruned, tapped or otherwise wounded.
2. It occurs from cut ends or surfaces of plants.
3. It takes place when plant is cut, pruned, tapped or otherwise wounded.
4. In bleeding considerable quantity of sap upto the extent of 10-15 liters per day comes out with considerable force.

5. There are two main factors responsible for bleeding i.e. hydrostatic pressure in the xylem and phloem elements and root pressure.
6. Bleeding is often seen in many land plants in the spring, particularly grape wine, some palms, sugar maple etc.
- 17. A) Pulmonary Circulation:**
It is the part of circulatory system which delivers blood to and from the lungs for oxygenation. Or
Pulmonary Circulation is by pulmonary arch carrying deoxygenated blood from right ventricle to lungs and blood returns to left atrium after oxygenation via pulmonary veins.
- B) Systemic Circulation: -**
It is the part of circulatory system that delivers blood to and from the tissues and organs of the body. Or
System Circulation is by systemic arch distributing blood to different parts of the body and the blood returns from the body to the heart in the right atrium via precaval and postcaval.
- 18. Blood Platelets and their Function: -**
See Bahawalpur Board Answer No: 8
- 19. Active Immunity: -**
See Multan Board Answer No: 4
- 20. A) Plasmolysis: -**
See Mutan Board Answer No: 5
B) Effect of Plasmolysis on the Cell: -
Cell shrinks due to exosmosis.
- 21. Apoplast Pathway of H₂O to reach Xylem tissues: -**
See Multan Board Answer No: 12

Lahore Board Questions

1. What is an Apoplast Pathway? (A-2007)
2. What is Osmotic Potential? (A-2007)
3. What is kPa? (A-2007)
4. What is bleeding in Plants? (A-2007)
5. State Pressure Flow Theory. (A-2008)
6. Define Imbibition. (A-2008)
7. What is Pulmonary Circulation? (A-2008)
8. Give the role of Platelets. (A-2008)
9. Differentiate between Solute and Pressure Potential. (A-2009)
10. How Stomata Open? Give one method. (A-2009)
11. Differentiate between Active and Passive Immunity? (A-2009)
12. What is Blood Pressure? (A-2009)
13. Differentiate between an Artery and a Vein. (A-2010)
14. What is difference between Antigen and Antibody? (A-2010)
15. What do you know about Imbibitions? (A-2010)
16. Define Transpiration. Write its effects on Plants. (A-2011)

17. Differentiate between Water Potential and Solute Potential. (A-2011)
18. What do you know about Bleeding in Plants? (A-2011)
19. Compare Diffusion with Osmosis. (A-2011)
20. Define Apoplast Pathway. (A-2012)
21. Define Imbibition. (A-2012)
22. What do you know about Guttation? (A-2012)
23. Define Diffusion. (A-2012)
24. What is Plasmolysis? (A-2012)
25. Differentiate between Cohesion and Adhesion. (A-2012)
26. Define Stomatal Transpiration. (A-2012)
27. What is Cell-Mediated Response and Humoral Response? (A-2012)
28. What do you know about Myocardial Infarction? (A-2012)
29. Write a note on Electrocardiogram. (A-2012)
30. Differentiate between Single Circuit Heart and Double Circuit Heart. (A-2012)
31. What are blue babies? (Group I-A-2013)
32. Differentiate between pulmonary circulation and systemic circulation. (Group I-A-2013)
33. Define active immunity. (Group II-A-2013)
34. State the names of two types of leucocytes. (Group II-A-2013)

Answers

1. **Apoplast Pathway: -**
See Multan Board Answer No: 12
2. **Osmotic Potential: -**
Osmotic potential is a measure of the change in the water potential of a system due to presence of solute molecules. It is always negative. More solute molecules present, lower or more negative is the osmotic potential. Or
1. Osmotic potential is the tendency of a solution to diffuse into another when the solutions of two different concentrations are separated by a differentially permeable membrane.
2. Pure water is assigned the osmotic potential zero as the highest.
3. Since the osmotic potential decreases as the osmotic concentration increases all solutions have value of less than zero.
3. **kPa: -**
It is the pressure exerted by a vertical force of one Newton on an area of 1 metre square.
4. **Bleeding in Plants: -**
See Dera Ghazi Khan Board Answer: 16
5. **Pressure Flow Theory: -**
See Dera Ghazi Khan Answer No: 6
6. **Imbibition: -**
See Multan Board Answer No: 28
7. **Pulmonary Circulation: -**
It is the part of circulatory system which delivers blood to and from the lungs for oxygenation. Or
Pulmonary Circulation is by pulmonary arch carrying deoxygenated blood from right

ventricle to lungs and blood returns to left atrium after oxygenation via pulmonary veins.

8. **Role of Platelets: -**
See Bahawalpur Board Answer No: 12

9. **Differences between Solute and Pressure Potential: -**

| Solute Potential | Pressure Potential |
|--|---|
| 1. The concentration of solute particles in a solution is known as Solute Potential. | 1. Turgor pressure which is a physical pressure that results as water enters the cell vacuole is referred to as Pressure Potential. |
| 2. The more is the concentration of solute in a solution less is the solute potential. | 2. The more is the water in vacuole of a cell, more is the pressure potential. |

10. **Opening of Stomata:**
Guard cells are the only photosynthesizing cells of epidermis of leaf and sugars are produced in them during day time when light is available. As sugar increases in the guard cells osmotic potential of the guard cells also increases that lead to endosmosis and ultimately to turgidity of guard cells and opening of stomata.. In dark sugar in the guard cells is either converted in soluble starch or used in respiration due to which osmotic potential of guard cells is lowered. Water leaves the guard cells which become flaccid and stoma or pore between them closes.

11. **Differences between Active and Passive Immunity: -**
See Multan Board Answer No: 23

12. **Blood Pressure: -**
See Multan Board Answer No: 22

13. **Differences between an Artery and a Vein: -**
Bahawalpur Board Answer No: 11

14. **Differences between Antigen and Antibody: -**
See Multan Board Answer No: 11

15. **Imbibitions: -**
See Multan Board Answer No: 28

16. **A) Transpiration: .**
The evaporation of water from the aerial parts of plants especially through stomata of leaves is a process called Transpiration.
B) Effects of Transpiration on Plants: -
1. It creates pulling force called Transpiration Pull for the conduction of water and salts from roots to aerial parts of plants.
2. It leaves a cooling effect on plants.

3. It provides wet environment to the cells of leaves where gaseous exchange occurs.
4. Minerals dissolved in water are distributed throughout plant body by transpiration pull.

17. **Differences between Water Potential and Solute Potential: -**

| Water Potential | Solute Potential |
|---|--|
| 1. Water Potential of a plant cell is the sum of its pressure potential and solute potential. | 1. It is potential of solutes to attract water towards them which depends upon the quantity of solute in a solution.. |
| 2. Water potential regulates movement of water through a whole plant as well as across cell membrane. Pure water has a water potential of Zero. Water will move to the cell with more negative water potential. | 2. Solute potential of a solution can withdraw water from other solution separated by a differentially permeable membrane. Water will move to the cell with less solute potential. |

18. **Bleeding in Plants: -**
See Dera Ghazi Khan Board Answer: 16

19. **Comparison of Diffusion with Osmosis: -**

| Diffusion | Osmosis |
|--|--|
| 1. It is the movement of ions or molecules or solute particles from the region of higher concentration to a region of lower concentration. | 1. It is the movement of water or any other solvent molecules through a semipermeable membrane from a region of its higher concentration to a region of its lower concentration. |
| 2. Diffusion may or may not occur through semipermeable membrane. | 2. Osmosis must occur through semipemeable membrane usually |
| 3. Through biological membranes solute molecule diffuse slowly. | plasma membrane of cells. 3. Movement of solvent molecules through biological membranes is rapid. |

20. **Apoplast Pathway: -**
See Multan Board Answer No: 12

21. **Imbibition: -**
See Multan Board Answer No: 28

22. Guttation: -

See Multan Board Answer No: 20

23. Diffusion: -

1. Diffusion is the movement of ions or molecules from the region of higher concentration to the region of lower concentration. Or
It is the net movement of a kind of molecule from an area of higher concentration to an area of lesser concentration.
2. Movement of molecules is always random and is due to kinetic energy found in the individual molecules but diffusion is the overall movement or resultant movement called net movement, the direction of which is determined by the relative concentration of molecules.
3. The rate of diffusion is related to the kinetic energy and size of the molecules.
-
-
4. Because diffusion only occurs when molecules are unevenly distributed, the relative concentration of molecules is important in determining how fast diffusion occurs.
The difference in concentration of molecules over a distance is known as concentration gradient or diffusion gradient. When molecules are equally distributed, no such gradient exists.
5. Diffusion is an important means by which materials are exchanged between a cell and its environment through plasma membrane.

24. Plasmolysis: -

It is the shrinkage of cytoplasm and pulling away of the plasma membrane from the cell wall when a plant cell (or other walled cell) loses water, usually in hypertonic environment.

25. Difference between Cohesion and Adhesion: -

See Bahawalpur Board Answer No: 6

26. Stomatal Transpiration: -

1. It is a type of transpiration in which water vapors escape through stomata. 90 %
transpiration in plants is stomatal.
2. Each stoma is formed by two thick walled guard cells.
3. In isobilateral leaves stomata are present in both upper and lower epidermis e.g. lily and maize leaf.
4. In dorsiventral leaves stomata are confined to only lower epidermis.

27. A) Cell-Mediated Response:

It is the direct immune response with no intervention of antibody in which antigen is bound to receptor sites on the surface of sensitized T lymphocytes to cause release of lymphokines that affect macrophages. Or

cells called
foreign
rejection of
Response.

It is a type of response in which sensitized (exposed to antigen) immune T lymphocytes directly attack intracellular pathogens, tumor cells or other tissues.

Or
T cells recognize antigen, then combat microorganisms and/ or affect the foreign tissue (in case of tissue transplant). This is called Cell-Mediated Response.

Or
It is a type of response in which a kind of lymphocytes originates in bone marrow, but instead of migrating straight to the lymph nodes, it first goes to the thymus gland where it is turned into T lymphocytes. These T lymphocytes themselves, rather than antibodies, attack the antigen.

B) Humoral Response: -

synthesise
antibodies
with and
This is called
produced by
in the
production.

It is the immune response in which antibodies are the principal effectors.

Or
B cells recognize antigens and form plasma cell clone. These plasma cells and liberate antibodies into the blood plasma and tissue fluid. Here these attach to surface of bacteria and speed up their phagocytosis or combine neutralize toxins produced by microorganisms by producing antitoxins. This is called Humoral Immune Response.

Or
It is a type of response in which antibodies (immunoglobulins) are antigen-stimulated cells called B-lymphocytes. These antibodies circulate in the blood and react specifically against the antigen which caused their production.

Or
It is a type of response in which B-lymphocytes originate in the bone marrow and then migrate to the lymph nodes where they proliferate into plasma cells that in turn give rise antibodies which attack the antigens.

28. Myocardial Infarction: -

1. It refers to the death or necrosis of the part of heart muscles.
2. It is commonly known as Heart Attack.
3. It is characterized in most cases by severe continuous chest pain
3. It occurs due to blockage of blood vessel in the heart (any of the coronary artery) by an embolus or locally formed thrombus and the blood supply to some cardiac muscles stops. As consequence, the effected cardiac muscles die due to lack of nutrients and oxygen. If area is small the victim may recover from the heart attack but death of the large area of cardiac muscles is fatal.

29. A note on Electrocardiogram: -

See Multan Board Answer No: 35

30. **Differences between Single Circuit Heart and Double Circuit Heart: -**

| Single Circuit Heart | Double Circuit Heart |
|--|--|
| 1. In single circuit heart blood flows in one direction. 2. Oxygenated blood from gills is not returned to heart and is supplied to body tissues. 3. It receives deoxygenated blood from the body issues and never receives oxygenated blood. 4. It supplies deoxygenated blood to gills for oxygenation. | 1. In double circuit heart blood flows in two directions. 2. Oxygenated blood from lungs is returned to heart. 3. It receives deoxygenated blood from the body tissues as well as oxygenated blood from lungs. 4. It supplies deoxygenated blood to lungs and oxygenated blood to body tissues. |

31. **Blue Babies: -**
See Multan Board Answer No: 27

32. **Differences between Pulmonary Circulation and Systemic Circulation: -**
See Multan Board Answer No: 39

33. **Active Immunity: -**
See Gujranwala Board Answer No: 18 (A)

34. **Names of Two Types of Leucocytes: -**
1. Granulocytes
2. Agranulocytes

Gujranwala Board
Questions

1. Write about Lenticular Transpiration. (A-2007)
2. What do you know about Vein? (A-2007)
3. What is Closed Circulatory System? (A-2007)
4. Explain Immunity and give its types. (A-2007)
5. What is Stroma? Give its function. (A-2008)
6. Why animal cells can not with stand a Higher Pressure Potential? (A-2008)
7. Give the Names of Three Main Blood Vessles and their Functions in Earthworm. (A-2008)
8. State the Pathway of Blood in a Single Circuit Heart. (A-2008)
9. Write Two Important Chemicals produced by Basophils. What functions do they form?
(A-2008)
10. Define Plasmolysis and Deplasmolysis. (A-2009)
11. What are Guttation and Imbibition? (A-2009)
12. What are Blue Banies? (A-2009)
13. What are Casparian Strips abd their Role? (A-2010)
14. Give Two Factors Respnsponsible for Bleeding in Plants. (A-2010)
15. What is a Single Circuit Heart? Give example. (A-2010)
16. Differentiate between Myocardial Infarction and Hemorrhage. (A-2011)
17. Define Osmotic Potential. (A-2011)

18. Define Active Immunity and Passive Immunity. (A-2011)
19. Why Root Pressure is not enough to push Water Upwards to Required Height in most of the Plants? (A-2011)
20. Define Facilitated Diffusion and quote one example. (A-2012)
21. Differentiate between Stoke and Hemorrhage. (A-2012)
22. Differentiate between Diffusion and Active Transport. (A-2012)
23. What is Cohesion Tension Theory of Ascent of Sap? Who proposed it? (A-2012)
24. What is Plasmodesmata? (A-2013)
25. What is the function of pacemaker? (A-2013)

Answers

1. Lenticular Transpiration: -

1. It is the loss of water vapors through lenticels.
2. In woody stems and roots there are dead cells beneath the epidermis which form cork tissue. This tissue has pores which are called lenticels that are involved in the exchange of gases and transpiration.
3. It occurs in some plants, not all.
4. It is 1-2 % of total respiration by a plant.

2. Vein: -

1. It collects blood from body through capillaries and transports it towards heart.
2. It usually has deoxygenated blood except pulmonary vein which has oxygenated blood.
3. It has larger bore and thin walls.
4. The vein has three layers, outer is made of connective tissue and elastic fibers, middle layer is thin and slightly muscular with few elastic fibers and inner layer is made of endothelium.
5. Semilunar valves are present in the veins which prevent backward flow of blood.
6. Veins join to form larger veins and ultimately form two vena cava that pour the blood in to the right atrium of the heart.
7. The pressure of the surrounding muscles, when they contract, tends to squash the veins and assist the return of blood towards heart.

3. Closed Circulatory System: -

1. The blood circulates through closed blood vessels and does not come out at any place in direct contact with the surrounding tissues.
2. It consists of interconnected system of arteries, veins and capillaries.
3. Blood is pumped by the heart rapidly around the body under sustained high pressure and back to the heart.
4. It transports digested food, excretory products as well as gases.
5. It is observed in animals belonging to annelids, cephalopod molluscs, echinoderms and vertebrates.

4. A) Immunity: -

The ability of the body to resist microorganisms, their toxins if any, foreign cells and abnormal cells of the body is termed as Immunity. Or
 The capacity to recognize the intrusion of any material foreign to the body and to mobilize cells and cell products to help remove the particular sort of foreign material with greater speed and effectiveness is called Immunity.
 Or
 Immunity is the protection from infection, re-infection and hyper-infection. Or
 Immunity is the capability of human body to resist almost all types of organisms or toxins that tend to damage tissues and organs.

B) Types of Immunity: -

There are two types of immunity.

1. Active Immunity:

It is the immunity in which antibodies or lymphocytes are produced by the body itself as a result of exposure to antigens. It is also divided into two types.

a. Naturally induced Active Immunity: -

It is a type of immunity which develops after recovery from disease or when the body is exposed to infection

b. Artificially induced Active Immunity: -

It is a type of immunity that is developed by inoculation of human body with inactive or weakened or attenuated organisms or pathogens or pathogenic products called vaccines.

2. Passive Immunity:

It is a type of immunity which is not developed by the body itself, instead it is gained by the body from an outside source. It is also of two types.

a. Naturally induced Passive Immunity:

It is a type of immunity which a developing fetus acquires naturally in the form of antibodies from mother through placenta and new born infant through milk during breast feeding.

b. Artificially induced Passive Immunity:

It is a type of immunity which can be achieved by infusing antisera (antibodies), activated T cells or both obtained from the blood of someone else or from other animal that has been actively immunized against antigen.

5. A) Stroma:

It is a fluid matrix or interior of the chloroplast in which thylakoids and grana are suspended.

B) Function:

It is the site where carbon is fixed and reduced resulting in the synthesis of sugar during the dark reactions of photosynthesis. Or
 It is the site of the Rections of the Calvin Cycle.

- 6. Animal cells can not with stand a Higher Pressure Potential: -**
Animal cells can not with stand a Higher Pressure Potential because they do not have cell walls.
- 7. Names of Three Main Blood Vessles and their Functions in Earthworm: -**
- | Names | Functions |
|-----------------------------------|--|
| 1. Dorsal Blood Vessel | It collects the blood from the 14 th segments backward. In the first 13 segment it becomes distributing channel and sends blood to hearts and anterior end of the body. |
| 2. Ventral Blood Vessel | It is the chief distributing vessel with backward flow. |
| 3. Sub-neural Blood Vessel | It is collecting vessel with backward flow of blood. |
- 8. Pathway of Blood in a Single Circuit Heart: -**
See Multan Board Answer No: 18
- 9. Two Important Chemicals produced by Basophils and their functions: -**
- Heparin** It prevents blood clot. Or
It inhibits blood clotting.
 - Histamine** It causes inflammation. Or
It participates in allergic reactions and in response to tissue damage and microbial invasion.
- 10. Plasmolysis and Deplasmolysis: -**
See Dera Ghazi Khan Board Answer No: 11
- 11. A) Guttation: -**
See Multan Board Answer No: 20
B) Imbibition: -
See Multan Board Answer No: 28
- 12. Blue Babies: -**
See Multan Board Answer No: 27
- 13. A) Casparian Strips: -**
Casparian Strips are waxy belts that extend through the walls of endodermal cells of roots. Casparian Strips contain suberin, a fatty material that is water proof. Or
Casparian strips are water proof fatty bands that surround each endodermal cell wall perpendicular to the root's surface. Or
Casparian Strips are bands of water proof material around the radial and transverse walls of endodermal root cells.
- B) Role of Casparian Strips: -**
Casparian Strips force water and minerals to pass through the plasma membranes, rather than through the air spaces in the cell walls. Or
Casparian Strips block the passage of water and nutrient minerals along the cell walls between adjoining endodermal cells.

14. **Two Factors Responsible for Bleeding in Plants:** -
1. Hydrostatic pressure in xylem and phloem elements
 2. Root pressure exerted by xylem tissues of roots

15. **Single Circuit Heart with example:** -
See Dera Ghazi Khan Board Answer No: 5

16. **Difference between Myocardial Infarction and Hemorrhage:**

| Myocardial Infarction | Hemorrhage |
|---|---|
| <ol style="list-style-type: none"> 1. It is necrosis or death of the part of heart. 2. It occurs due to interruption of blood supply and hence oxygen to heart. | <ol style="list-style-type: none"> 1. It is the discharge of blood from blood vessel in any part of the body including heart. 2. It occurs due to atherosclerosis, thrombo-embolism and hypertension. |

17. **Osmotic Potential:** -
See Lahore Board Answer No: 2

18. **A) Active Immunity:** -
1. It is the immunity in which antibodies or lymphocytes are produced by the body itself as a result of exposure to antigens.
 2. It can occur naturally after recovery from disease or can be artificially induced by immunization with vaccine.
 3. It takes time in developing.
 4. It is long lasting.

- B) Passive Immunity:** -
1. It is a type of immunity which is not developed by the body itself, instead it is gained by the body from an outside source.
 2. In passive immunity, antibodies or sensitized T-lymphocytes, that have been produced in another person or animal, are introduced into the body of non-immune person naturally or artificially.
 3. It affords protection for a limited period.
 4. It provides immediate protection.

19. **Root Pressure not enough to push Water Upwards to Required Height in Plants?**
Root Pressure generates hydrostatic pressure of round about 100 to 200 KPa, that is not enough to push Water Upwards to Required Height in most of the Plants.

20. **Facilitated Diffusion:** -
It is a type of diffusion in which carrier molecules within the cell membrane transport molecules across the membrane. These carrier molecules are proteins which are present within the cell membrane of epidermal cells and other root cells.
Example: Nutrients cross the cell membrane of epidermal cells of roots by facilitated diffusion.

21. **Difference between Stroke and Hemorrhage:** -
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| Stroke | Hemorrhage |
|---|--|
| 1. It is necrosis or death of the part of brain. | 1. It is the discharge of blood from blood vessel in any part of the body including brain. |
| 2. It occurs due to interruption of blood supply and hence oxygen to brain. | 2. It occurs due to atherosclerosis, thrombo-embolism and hypertension. |

-

-

22. Cohesion Tension Theory of Ascent of Sap: -

Cohesion Tension Theory explains that water is pulled up through the xylum due to transpiration from the plant’s leaves, the adhesion of water to plant vessel walls, and the cohesion of water molecules to each other rather than being pushed upwards due to root pressure..
Dixon proposed Cohesion Tension Theory.

23. Differences between Diffusion and Active Transport: -

| Diffusion | Active Transport |
|--|--|
| 1. Diffusion is the net movement of a kind of molecules from an area of higher concentration to an area of lower concentration. | 1. The process of using a carrier protein to move molecules up a concentration gradient is called active transport. |
| 2. Diffusion is due to kinetic energy found in the individual molecules and does not require any cellular energy in the form of ATP. | 2. This transport takes place at the expense of cells metabolic energy-ATP. |
| 3. It is not specific and may and may not be carried by carrier protein molecules.It may or may not takes place through membrane. | 3. Active transport is very specific. Only certain molecules or ions are able to be moved in this way and must be carried by the proteins in the membrane. |
| 4. It takes place in the living as well as non-living systems. | 4. It occurs in living systems. |

24. Plasmodesmata: -

Plasmodesmata are cytoplasmic strands that extend through pores in adjacent cell walls.
They connect cytoplasm of neighbouring cells.

25. The Function of Pacemaker: -

Pacemaker is responsible for initiating the impulses which trigger the heart beat rate.

Rawalpindi Board
Questions

- 1. What are Isobilateral Leaves? (A-2010)
- 2. Give the Composition of Honey Dew. (A-2010)
- 3. What is the Pathway of Blood in Single Circuit Heart? (A-2010)
- 4. Define Guttation. (A-2011)
- 5. State Pressure Flow Theory. (A-2011)
- 6. Differentiate between Vasodilation and Vasoconstriction. (A-2011)
- 7. Define Immunity. Name its types. (A-2011)
- 8. State Pressure Flow Theory. Who proposed it? (A-2012)
- 9. Differentiate between Pulmonary and Systemic Circulation. (A-2012)
- 10. Define Bleeding in Plants. Give its causes. (A-2012)
- 11. Differentiate between Plasmolysis and Deplasmolysis. (A-2012)
- 12. Define systemic circulation in man. (A-2013)
- 13. Define pressure flow theory. (A-2013)

Answers

- 1. **Isobilateral Leaves: -**
The leaves which have both sides similar to each other are called Isobilateral Leaves.
In isobilateral leaves stomata are present , in both, upper and lower epidermis.
Examples: Leaf of Lily, Maize Leaf etc.
- 2. **Composition of Honey Dew: -**
Composition of Honey Dew revealed that it contains 10-25 % dry matter , 90 % or more of which is sucrose. Nitrogenous compounds are about 1 %.
- 3. **Pathway of Blood in Single Circuit Heart: -**
See Multan Board Answer No: 18
- 4. **Guttation: -**
See Multan Board Answer No: 20
- 5. **Pressure Flow Theory: -**
See Dera Ghazi Khan Board Answer No: 6
- 6. **Differences between Vasodilation and Vasoconstriction: -**

| Vasodilation | Vasoconstriction |
|--|---|
| <ul style="list-style-type: none">1. It is expansion of diameter of blood vessels.2. It occurs due to relaxation of smooth muscle layer of the arterioles.3. It decreases resistance and increases blood flow to an organ. | <ul style="list-style-type: none">1. It is narrowing of the diameter of blood vessels.2. It occurs due to contraction of smooth muscle layer of the arterioles.3. It increases resistance and decreases blood flow to an organ. |

- 7. **Immunity and its types: -**
- 432

See Gujranwala Board Answer No: 4

8. Pressure Flow Theory and the name who proposed it: -

Pressure Flow Theory states that the flow of solution in the sieve elements is driven by an osmotically generated pressure gradient between source and sink. Ernst Munch in 1930 proposed it.

9. Difference between Pulmonary and Systemic Circulation: -

See Multan Board Answer No: 39

10. Bleeding in Plants and its causes: -

See Dera Ghazi Khan Board Answer No: 16

11. Differences between Plasmolysis and Deplasmolysis:

| Plasmolysis | Deplasmolysis |
|--|--|
| 1. It occurs when normal cell is placed in hypertonic environment (solution). | 1. It occurs when plasmolysed cell is placed in distilled water. |
| 2. Exosmosis of water takes place. | 2. Endosmosis of water takes place. |
| 3. Shrinkage of cytoplasm and pulling away of the plasma membrane from the cell wall occurs. | 3. Cell restores its normal structure. |
| 4. Cell is called plasmolysed. | 4. Cell is called deplasmolysed. |

12. Systemic Circulation in Man: -

See Sargodha Board Answer No: 10

13. Pressure Flow Theory: -

See Dera Ghazi Khan Board Answer No: 6

Sargodha Board

Questions

1. What are different types of Transpiration? (A-2010)
2. Give the Role of Platelets. (A-2010)
3. Differentiate between Apoplast and Symplast Pathway of Water during absorption. (A-2010)
4. What is Incipient Plasmolysis? (A-2010)
5. Differentiate between Passive Immunity and Active Immunity. (A-2010)
6. Name the factors affecting the Rate of Transpiration. (A-2010)
7. What is Humoral Immune Response? (A-2011)
8. Define the term "Thrombo-Embolic"! (A-2011)
9. Define "Systolic Pressure" and Diastolic Pressure"! (A-2011)
10. Define Systemic Circulation. (A-2011)
11. Write Apoplast and Symplast Pathways. (A-2012)
12. What do you know about Thalassaemia? (A-2012)
13. What do you know about Blue Babies? (A-2012)
14. How Thrombus-Formation takes place? (A-2012)
15. What is Lenticular Transpiration? (A-2012)
16. What is Imbibition? (A-2012)
17. Define Plasmolysis and Pressure Potential. (A-2012)
18. Differentiate Apoplast from Symplast Pathway of Water in Plants. (A-2012)

19. What is active immunity? (A-2013)
20. What is meant by cell mediated response? (A-2013)

Answers

1. **Different types of Transpiration:** -
See Bahawalpur Board Answer No: 15
2. **Role of Platelets:** -
See Bahawalpur Board Answer No: 12
3. **Difference between Apoplast and Symplast Pathway of Water during absorption:** -
See Bahawalpur Board Answer No: 19
4. **Incipient Plasmolysis:** -
The point at which plasmolysis is just to happen is called Incipient Plasmolysis.
Or
The point when cytoplasm just starts to separate from cell walls called Incipient Plasmolysis.
At incipient plasmolysis the protoplast has just ceased to exert any pressure against the cell wall, so the cell is flaccid.
5. **Differences between Passive Immunity and Active Immunity:** -
See Multan Board Answer No: 23
6. **Names of the factors affecting the Rate of Transpiration:** -
 1. Light
 2. Temperature
 3. CO₂ Concentration
 4. Humidity and Vapor Pressure
 5. Wind
 6. Availability of Soil Water
7. **Humoral Immune Response:** -
It is a type of response in which B-lymphocytes originate in the bone marrow and then migrate to the lymph nodes where they proliferate into plasma cells that in turn give rise to antibodies which attack the antigens.
8. **Thrombo-Embolic:** -
Formation of a thrombus and its dislocation to other site in the circulatory system as embolus is called Thrombo-Embolic which is leading cause of deaths in western civilization.
9. **A) Systolic Pressure:** -
It is the peak pressure during ventricular systole (contraction of ventricles).
Systolic blood pressure in normal individuals is 120 mmHg.
B) Diastolic Pressure: -
It is the minimum pressure between heart beats.
Diastolic pressure in normal individuals ranges between 75-85 mmHg.
10. **Systemic Circulation:** -

Systemic Circulation is by systemic arch distributing blood to different parts of the body and the blood returns from the body to the heart in the right atrium via precaval and postcaval.

11. A) Apoplast Pathway: -

It is a pathway consisting of the interconnected porous plant cell walls along which water moves freely. Casparian strips in the walls of endodermis block the apoplast pathway.

B) Symplast Pathway:

In this pathway water flows directly through the plasma membranes and the protoplasts of the cells, passing from one cell to the next by way of the plasmodesmata.

12. Thalassaemia: -

1. It is also called Cooley's anemia on the name of Thomas B Cooley.
2. It is a genetically transmitted hemoglobin abnormality.
3. In Thalassaemia hemoglobin molecule, in most cases, does not have B chain in it instead F chain is present (F is fetal hemoglobin).
4. It is more common in children.
5. It is characterized by enlargement of kidney, the presence of microcytes by splenomegaly (enlargement of spleen) and by changes in the bones and skin.
6. The regular blood transfusion is the only remedy. It can be cured by bone marrow transplant--which is very expensive and does not give 100 % cure rate.

13. Blue Babies: -

See Multan Board Answer No: 27

14. Thrombus-Formation: -

Thrombus-Formation occurs due to:

1. Irritation or infection of lining of blood vessels.
2. Reduced rate of blood flow, due to long periods of inactivity.
3. Pneumonia and tuberculosis, emphysema etc.

15. Lenticular Transpiration: -

See Gujranwala Board Answer No: 1

16. Imbibition: -

See Multan Board Answer No: 28

17. A) Plasmolysis: -

It is the shrinkage of cytoplasm and pulling away of the plasma membrane from the cell wall when a plant cell (or other walled cell) loses water, usually in hypertonic environment.

B) Pressure Potential: -

Turgor pressure which is a physical pressure that results as water enters the cell vacuole is referred to as Pressure Potential.

18. Differences between Apoplast and Symplast Pathway of Water in Plants: -

See Bahawalpur Board Answer No: 19

19. Active Immunity: -

See Gujranwala Board Answer No: 18 (A)

20. Cell Mediated Response: -

See Lahore Board Answer No: 27 (A)

Faislabad Board Questions

1. Compare Monocyte with Lymphocyte. (A-2007)
2. What is Electrocardiogram? (A-2007)
3. Write the difference between Guttation and Bleeding. (A-2008)
4. Define Facilitated Diffusion. (A-2008)
5. What is Single Circuit and Double Circuit Heart? (A-2008)
6. What is Symplast Pathway? (A-2008)
7. What are Blue Babies? (A-2009)
8. What is Immunity? (A-2009)
9. What are Sinks in Phloem Transport? (A-2009)
10. j*Define Imbibition. (A-2009)
11. What is Stroma? Give its function. (A-2010)
12. What is Water Potential? Give its Equation. (A-2011)
13. Differentiate between Source and Sink. (A-2011)
14. Give the location of Bicuspid and Tricuspid Valve in the Human Heart. (A-2011)
15. Differentiate between Active Immunity and Passive Immunity. (A-2011)
16. Define Antiserum. (A-2012)
17. Define Passive Immunity. (A-2012)
18. What do you know about Cell-Mediated Response? (A-2012)
19. What is Bursa of Fabricius? (A-2012)
20. What is difference between thrombus and embolus? (A-2013)
21. Differentiate between source and sink. (A-2013)

Answers

1. Comparison of Monocyte with Lymphocyte: -

See Multan Board Answer No: 7

2. Electrocardiogram: -

See Multan Board Answer No: 35

3. Differences between Guttation and Bleeding: -

See Multan Board Answer No: 38

4. Facilitated Diffusion: -

See Dera Ghazi Khan Board Answer No: 7

5. A) Single Circuit Heart:

See Dera Ghazi Khan Board Answer No: 5

B) Double Circuit Heart: -

Double Circuit Heart has separate pulmonary and systemic circulation. It supplies deoxygenated blood to lungs and oxygenated blood to body tissues while it receives deoxygenated blood from the body tissues as well as oxygenated blood from lungs

6. Symplast Pathway: -

protoplasts of

the cells, passing from one cell to the next by way of the plasmodesmata.

- 7.

See Multan Board Answer No: 27

- 8.**

See Gujranwala Board Answer No: 4 (A)

- 9.

See.Bahawalpur Board Answer No: 20 (B)

- 10.**

See Multan Board Answer No: 28

- 11.**

Gujranwala Board Answer No: 5

- 12.

potential.

- 14.**

chordeae

ventricle.

papillary

muscles of wall of left ventricle.

Or

ventricle.

Bicuspid valve is located at the opening between left atrium and left ventricle

- 13.**

| Source | Sink |
|--|---|
| <p>1. Sources are the sites from where carbohydrates are released.</p> <p>2. Sources are the organs which are capable of storing food and exporting the stored material and include photosynthetic tissues such as mesophyll of leaves.</p> <p>3. Food storage tissues such as the cortex of roots of beet (biennial plant) can become source in the second growing season when they export stored sugars in growth of new shoots.</p> | <p>1. Sinks are the sites where carbohydrates are utilized.</p> <p>2. Sinks are the areas of active metabolism or storage such as roots, tubers, developing fruits, immature leaves and even growing tips of roots and stems.</p> <p>3. Food storage tissues such as cortex of roots of beet (biennial plant) can act as sink in first growing season when they utilize and carbohydrate.</p> |

15. **Difference between Active Immunity and Passive Immunity:** -
See Multan Board Answer No: 23
16. **Antiserum:** -
Antiserum is a serum containing antibodies.
17. **Passive Immunity:** -
See Gujranwala Board Answer No: 18 (B)
18. **Cell-Mediated Response:** -
See Lahore Board Answer No: 27 (A)
19. **Bursa of Fabricius:**
Bursa of Fabricius is lymphoid structure present in the wall of cloaca of young birds
from where B-lymphocytes were discovered to have role in immune system.
20. **Difference between Thrombus and Embolus:** -
- | Thrombus | Embolus |
|---|--|
| Thrombus is a solid mass or plug of blood clot in a blood vessel. | It is blood clot that after formation is dislodged and carried to some other location in the circulatory system. |
21. **Differences between Source and Sink:** -
See Faislabad Board Answer No: 13

SECTION III

Essay Type Questions from Text Book

Each question carries 8 Marks

Q. to be asked 5
attempted 3

Q. to be

Total Marks: $8 \times 3 = 24$

Section III of Essay Type Questions consists of five questions i.e Q5, Q6, Q7, Q.8 and Q.9. Only any three questions are to be attempted. Each question has two parts “a” and “b” with four numbers each.

Number of Question to be asked from each Chapter

| | | | |
|---------------|------------------------|----------------|-----------|
| Chpater No: 1 | 1 Question of 4 Marks | Chpater No: 9 | --4 Marks |
| Chapter No: 2 | -1 Question of 4 Marks | Chpater No: 10 | Nil |
| Chapter No: 3 | Nil | Chpater No: 11 | -4 Marks |
| Chapter No: 4 | 1 Question of 4 Marks | Chpater No: 12 | -4 Marks |
| Chpater No: 5 | 1 Question of 4 Marks | Chpater No: 13 | -Nil |
| Chpater No: 6 | -1 Question of 4 Marks | Chpater No: 14 | --4 Marks |
| Chpater No: 7 | Nil | | |
| Chpater No: 8 | -1 Question of 4 Mark | | |

Model Paper of Multan Board Session 2012-2013 and onwards Section III

- Q5. a) Wite in detail two hypotheses for opening and closing of Stomata. (2+2)
b) Write a note on biological method. (0+4)
- Q6. a) Discuss any four functions of proteins. (4)
b) Describe plastids with their types. (1+3)
- Q7. a) Explain characteristics of Cyanobacteria. (4)
b) Write various steps of Evolution leaf. (4)
- Q8. a) Write a note on transport of cxygen in man. (4)
? b) Elaborate the non-phosphorylation with the help of diagram. (3+1)
- Q9. a) Explain digestion in stomach. (4)
b) Write a note on Zygomycetes. (4)

Chapter No: 1 Multan Board

1. What is the role of the study of Biology in the Welfare of Mankind? (8) (A207)
2. Write a short note on Biological Method of study of Biological Problem (5) (S-207)
3. What is the role of study of Biology in the welfare of mankind in the field of Health, Food

- and Environment. (8) (A-209)
4. How Biology has been helping mankind in the area of Health and Disease Control? (5) (A-2011)
5. Explain various steps in Biological Method. (4) (A-2013New)

Bahawalpur Board

1. Explain protection and conservation of Environment. (4) (A-2008)
2. Write a note on protection and conservation of environment. (4) (A-2009)
3. What is Cloning? Describe process of Cloning. Also write down its importance. (4) (A-2012)
4. How Biology helped mankind in the field of Food Production? (4) (A-2013)

Dera Ghazi Khan Board

1. Write a detailed note on protection and conservation of environment. (4) (A-2013)

Lahore Board

1. Describe protection and conservation of the environment. (4) (A-2006)
2. Explain the biological methods for solving biological problem. (4) (A-2007)
3. Write notes on the following. (A-2010)
- i) Preventive measures of disease (5)
 - ii) Vaccination (3)
4. Write a note on cloning. (4) (Group I-A-2013)
5. Describe biological organization at organ and system level. (4) (Group II-A-2013)

Gujranwala Board

1. Discuss briefly Phyletic Lineage. (3) (A-2010)
2. Write a note on cloning. (A-2013)

Rawalpindi Board

1. Describe contribution of Biology in the field of Health. (4) (A-2010)
2. Give an account of Biological Method. (4) (A-2011)
3. Describe the biological organization at population and community level. (4) (A-2013)

Sargodha Board

1. Describe importance of Biology in increasing food production. (4)
(A-2011)
2. Discuss briefly phyletic lineage in biological organization. (4)
(A-2012)
3. Write a note on cloning. (4) (A-2013)

Faislabad Board

1. Discuss briefly ohyletic lineage in biological organization. (4)
(A-2010)
2. Discuss the drug treatment and gene therapy against the diseases. (4) (A-2013)

Chapter No: 2

Multan Board

2. What are Amino Acids? Describe four levels of Protein Organization. (4)
(Model Paper 2006-2008)
3. What are Monosaccharides? Explain their structure and occurrence. (5)
(A-2008)
4. Write the functions of Proteins. (4) (S-2008)
5. Explain Primary Structure of Proteins. (3)
6. Write a note on Nucleic Acids. (4) (A-2010)
7. Describe Primary and Secondary Structure Levels of Protein Organization. (4)
(S-2010)
8. What is RNA? Describe various types of RNA. (4) (A-2013-New)
9. Define the structure and function of DNA. (4) (A-2013-Old)

Bahawalpur Board

1. Describe the different structures and function of Protein. (8) (A-2007)
2. Write a note on Acylglycerol. (4) (A-2010)
3. Describe various properties of water which make it ver important molecule for for life. (5) (A-2011)
4. Write in detail different types of RNA. (4) (A-2013)

Dera Ghazi Khan Board

1. What are Nucleic Acids and what are their types? (4) (A-2008)
2. What do you know about Polysaccharides? (4) (A-1010)
3. Write a note on primary and structure of proteins. (4) (A-2013)

Lahore Board

- | | | | |
|----|---|-----|-------------------|
| 1. | Write an essay on RNA and its types. | (6) | (A-2006) |
| 2. | Write an essay on Lipids. | (8) | (A-2008) |
| 3. | Describe biological properties and importance of water. | (4) | (A-2009) |
| - | | | |
| - | | | |
| 4. | Describe the structure of Proteins. | (4) | (A-2010) |
| 5. | Describe three main types of Ribonucleic Acids (RNA). | (4) | (A-2011) |
| 6. | Compare Monosaccharides with Oligosaccharides. | (4) | (A-2012) |
| 7. | What are polysaccharides? Describe different types. | (4) | (Group I-A-2013) |
| 8. | Explain different types of RNAs. | (4) | (Group II-A-2013) |

Gujranwala Board

- | | | | |
|----|--|-----|----------|
| 1. | Explain primary, secondary and tertiary structure of proteins. | (6) | (A-2006) |
| 2. | Write a detailed note on Monosaccharides. | (4) | (A-2008) |
| 3. | Write the Watson and Crick model of DNA. | (4) | (A-2009) |
| 4. | Compare Monosaccharides with Oligosaccharides. | (4) | (A-2010) |
| 5. | What are polysaccharides? Describe any three of them. | (4) | (A-2013) |

Rawalpindi Board

- | | | | |
|----|--|-----|-----------|
| 1. | Write a note on Acylglycerols. | (4) | (A-2010) |
| 2. | Differentiate between Fibrous and Globular Proteins. | (4) | (A-20013) |

Sargodha Board

- | | | | |
|----|---|-------|-----------|
| 1. | What do you know about Primary Structure of Proteins? | (4) | (A-2010) |
| 2. | Discuss primary and secondary structure of proteins. | (1+3) | (A-20013) |

Faislabad Board

- | | | | |
|----|---|-----|----------|
| 1. | Write a note on Oligosaccharides. | (4) | (A-2009) |
| 2. | Describe the importance of life in water. | (4) | (A-2010) |
| 3. | Describe primary and secondary structure of Proteins. | (4) | (A-2011) |

4. Write down the characteristics of Fibrous Proteins and Globular Proteins. (4)
(A-2012)
5. Write a note on importance of water. (4) (A-20013)

Chapter No:3

No Essay Type Question According to New Pattern

Chapter No:4

Multan Board

- | | | |
|---|-------|--------------|
| 1. Describe the structure and functions of: | (4+4) | (A-2007) |
| i) Glyoxisomes ii) Peroxisomes | | |
| 2. Write note on Plastids. | (5) | (S-2007) |
| 3. Write a note on Endoplasmic Reticulum. | (5) | (S-2007) |
| 4. Differentiate between Prokaryotes and Eukaryotes. | (4) | (A-2008)- |
| 5. Write a note on Plastids. | (3) | (S-2008) |
| 6. Write a note on Plastids. Explain with diagram. | (5) | (S-2009) |
| 7. Write a note on Plastids. Explain with diagram. | (4) | (A-2010) |
| 8. Write a detailed note on Plasma Membrane. | (4) | (S-2010) |
| 9. What are Plastids? Discuss their structure and role. | (4) | (A-2011) |
| 10. Differentiate between Prokaryotes and Eukaryotes. | (4) | (S-2011) |
| 11. What are Glyoxysomes? Give their structure and functions. | (2+2) | (A-2013-New) |
| 12. Discuss structure and function of Chloroplasts. | (4) | (A-2013-Old) |

Bahawalpur Board

- | | | |
|---|-----|----------|
| 1. Write a note on structure and functions of Mitochondria. | (4) | (A-2008) |
| 2. Write a note on Cell Wall. | (4) | (A-2010) |
| 3. Describe various types of Plastids. | (4) | (A-2011) |
| 4. Differentiate between Prokaryotes and Eukaryotes. | (4) | (A-2012) |
| 5. Write a note on Mitochondria. | (4) | (A-2013) |

Dera Ghazi Khan Board

1. Write down atleast three differences between Prokaryotic and Eukaryotic Cells. (3) (A-2008)
2. Write note on Plastids. (4) (A-2012)
3. Differentiate between prokaryotic and eukaryotic cell. (A-2013)

Lahore Board

1. Write notes on: (5) (A-2006)
i) Cytoskeleton ii) Plastids
2. What are Plastids? Explain the structure and function of Chloroplast. Draw figure. (4) (A-2010)
3. Write a note on Cytoskeleton. (4) (A-2011)
4. What are Plastids? Explain the structure and functions of Chloroplast. (4) (A-2012)
5. Write down the structure and functions of mitochondria. (4) (Group I-A-2013)
6. Write a note on cytoskeleton. (4) (Group II-A-2013)

Gujranwala Board

1. Compare structure and function of Chloroplasts and Mitochondria. (4) (A-2007)
2. Write a note on Endoplasmic Reticulum. (4) (A-2009)
3. In what ways prokaryotic cells are different from eukaryotic cells? (4) (A-2011)
4. Write a note on Ribosomes. (4) (A-2012)
5. Describe different types of plastids. (4) (A-2013)

Rawalpindi Board

1. Describe the structure of Chloroplast with the help of a diagram. (4) (A-2010)
2. Explain the structure and functions of Plasma Membrane. (4) (A-2011)
3. Differentiate between Prokaryotic and Eukaryotic Cells. (4) (A-2012)
4. Describe structure and function of plasma membrane. (4) (A-2013)

Sargodha Board

1. What are Plastids? Explain the structure and functions of each type. (4) (A-2010)
2. Describe briefly the Cell Wall. (4) (A-2011)
3. Describe differences between Prokaryotic and Eukaryotic Cells. (4) (A-2012)

4. Differentiate between Prokaryotic and Eukaryotic Cell. (4)
(A-2013)

Faislabad Board

- 1. Describe the structure and function of nucleus in detail. (8)
(A-2007)
- 2. What are Plastids? Describe their types and functions. (4)
(A-2008)
- 3. Explain the structure and functions of Endoplasmic Reticulum. (4)
(A-2010)
- 4. What are Cytoskeletons? Describe various types and their functions. (4)
(A-2011)
- 5. Write a note on plant Cell Wall. (4)
(A-2012)
- 6. Write a note on Golgi apparatus. (4) (A-2013)

Chapter No:5
Multan Board

- 1. Explain replication of Bacteriophage. (5) (S-2007)
- 2. Describe the structure of Virion. (4) (A-2008)
- 3. Briefly describe and draw the life cycle of Phage Virus. (4+1) (A-2009)
- 4. Describe the Lytic Life Cycle of Bacteriophage. (4) (A-2010)
- 5. Explain the Lytic Life Cycle of Bacteriophage. (4) (A-2011)
- 6. Describe the life cycle of Bacteriophages. (4) (A-2013-New)
- 7. Describe the life cycle of a bacteriophage. (4) (A-2013-Old)

Bahawalpur Board

- 1. Write about Hepatitis. (4) (A-2008)
- 2. Explain Lytic Life Cycle of Bacteriophage and draw the diagram. (5) (A-2009)
- 3. Explain lytic cycle of Bacteriophage. (4) (A-2010)
- 4. Discuss the Lytic Cycle of Bacteriophage. (4) (A-2011)
- 5. Give the biological classification of *Zea mays*. (4) (A-2013)

Dera Ghazi Khan Board

- 1. Discuss the life cycles of of Bacteriophage. (8)
(A-2008)

2. Give symptoms and causes of AIDS. (4)
(A-2009)
3. Explain the life cycles of Bacteriophages with diagram. (8)
(A-2010)
4. Show infection cycle of HIV with the help of diagram. (4)
(A-2011)
5. Describe infection cycle of HIV. (4)
(A-2012)
6. Describe the structure of virus. (4)
(A-2013)

Lahore Board

1. Write a note on AIDS. (5)
(A-2006)
2. What are Viruses? Give their discovery and general characteristics. (4)
(A-2006)
3. Describe life cycles of Bacteriophage. (8)
(A-2008)
4. Describe infection cycle of HIV with the help of diagram. (4)
(A-2009)
5. Elaborate infection cycle of HIV. (4)
(A-2010)
6. Describe structure of Viruses. (4)
(A-2012)
7. Describe lytic cycle of Bacteriophage. Show your answer with diagram. (4)
(A-2012)
8. Write a note on hepatitis. (4) (Group I-A-2013)
9. Describe Linnaeus System of Binomial Nomenclature in detail. (4) (Group II-A-2013)

Gujranwala Board

1. Describe the life cycles of a Bacteriophage. (8)
(A-2008)
2. What are Viruses? Give their three characteristics. (4)
(A-2009)
3. Give lytic cycle of Bacteriophage. Show your answer with diagram. (4)
(A-2010)
4. Write an essay on Hepatitis. (4)
(A-2011)
5. Describe "Lytic Cycle of Bacteriophage" (4)
(A-2012)
6. Draw infection cycle of HIV. (4) (A-2013)

Rawalpindi Board

1. Draw and label diagram showing life cycle of Bacteriophage. (4)
(A-2011)
2. Write a note on Retroviruses. (4) (A-2013)

Sargodha Board

- | | | | |
|-------|---|-----|-----|
| 1. | Explain lytic cycle of virus. | (4) | (A- |
| 2010) | | | |
| 2. | Describe two to Kingdom of Classification Syatem. | (4) | (A- |
| 2011) | | | |
| 3. | Describe life cycle of Bacteriophage. | (4) | (A- |
| 2012) | | | |
| 4. | Describe the life cycle of bacteriophage. | (4) | (A- |
| 2013) | | | |

Faislabad Board

- | | | | |
|-------|---|-----|-----|
| 1. | Describe development of two to five kingdom system of classification for organisms. (8) | | (A- |
| 2009) | | | |
| 2. | Explain lytic cycle in viruses. | (4) | (A- |
| 2012) | | | |
| 3. | Explain life cycle of bacteriophage. | (4) | (A- |
| 2013) | | | |

Chapter No:6

Multan Board

- | | | | |
|-----------|---|-----|-----|
| 1. | Describe the economic importance of of Cyanobacteria. | (3) | (A- |
| 2008) | | | |
| 2. | Write a note on Cyanobacteria. | (4) | |
| (S-2008) | | | |
| 3. | Describe different types of Bacteria with reference to Nutrition. | (4) | |
| (S-2009) | | | |
| 4. | Describe the general characteristics of Cyanobacteria. | (4) | |
| (A-2010) | | | |
| 5. | Explain the respiration in Bacteris. | (3) | |
| (S-2010) | | | |
| 6. | Write a note on Nutrition of Bacteria. | (4) | |
| (A-2011) | | | |
| 7. | Write a note on Nutrition in Bacteria. | (4) | |
| (S-2011) | | | |
| 8. | Write down economic importance of Cyanobacteria. | (4) | (A- |
| 2013-New) | | | |

Bahawalpur Board

- | | | |
|----------|--|-----|
| 1. | Write the postulates of Germ Theory of Diseases. | (3) |
| (A-2008) | | |
| 2. | Write the economic importance of Cyanobacteria. | (3) |
| (A-2009) | | |
| 3. | Describe the Nutrition of Bacteria. | (4) |
| (A-2010) | | |
| 4. | Write down characteristics of Cyanobacteria. | (4) |
| (A-2011) | | |
| 5. | Write a note on Nutrition of Bacteria. | (4) |
| (A-2013) | | |

Dera Ghazi Khan Board

1. Describe the postulates of Germ Theory of Disease. (4)
(A-2008)
2. Describe the nutrition of Bacteria. (4)
(A-2009)
3. Describe the structure and reproduction of Nostoc. (4)
(A-2013)
3. Write a note on uses and misuses of antibiotics. (5)
(A-2010)
4. Explain different phases of growth in Bacteria. (4)
(A-2010)
5. Describe various physical and chemical methods used for controlling microbes. (4) (A-2011)
6. Describe nutrition of Bacteria. (4)
(A-2012)

Lahore Board

1. Write down the characteristics of Cyanobacteria and its economic importance. (4)
(A-2007)
2. Describe the characteristics of Cyanobacteria. (4)
(A-2011)
3. Describe characteristics of Nostoc. (4)
(A-2012)
4. How bacteria get their nutrition? Explain. (4)
(A-2012)
5. Explain about use and misuse of Antibiotics. (4) (Group I-A-2013)
6. Discuss nutrition in bacteria. (4) (Group II-A-2013)

Gujranwala Board

1. Differentiate between Gram Positive and Gram Negative Bacteria. (6)
(A-2006)
2. Describe habitat and reproduction in *Nostoc*. (4)
(A-2009)
3. Explain general characteristics of Cyanobacteria with special reference to *Nostoc*. (8)
(A-2010)
3. Describe different methods to control bacteria. (4) (A-2011)
4. Describe nutrition in Bacteria. (4) (A-2012)
5. Classify the bacteria with reference to presence of flagella. (4) (A-2013)

Rawalpindi Board

1. What are Cyanobacteria? Discuss in detail *Nostoc*. (4) (A-2013)

Sargodha Board

1. Explain characteristics of Cyanobacteria. (4) (A-2013)

Faislabad Board

1. Describe physical and chemical methods to control bacteria. (4) (A-2011)
2. Write nutrition in bacteria. (4) (A-2013)

Chapter No:7

No Essay Type Question According to New Pattern

Chapter No:8

Multan Board

1. With the help of diagram explain the life cycle of *Rhizopus*. (5)
(S-2007)
2. Describe Asexual Reproduction in Fungi. (4)
(A-2008)
3. Write Economic Gains due to Fungi. (4)
(S-2008)
4. Give the beneficial importance of Fungi. (4)
(S-2009)
5. Describe Sexual Reproduction in Fungi. (4)
(A-2010)
6. Discuss Economic Losses due to Fungi. (4)
(A-2011)
7. Describe disease cycle of loose smut of wheat caused by *Ustilago tritici* (Club Fungus). (4)
(S-2011)
8. What is "Ecological Importance of Fungi"? (4)
(A-2012)
9. Narrate four points of Economic Gains due to Fungi. (4)
(A-2013-New)
10. Write a note on Mycorrhizae in detail. (4)
(A-2013-Old)

Bahawalpur Board

1. Describe the characteristics that enable Fungi to adapt the land environment. (8)
(A-2007)
2. What is the economic importance of Fungi? (4)
(A-2008)
3. Write Economic Loss due to Fungi. (4)
(A-2010)
3. How do Fungi reproduce asexually? (4)
(A-2010)

4. How does asexual reproduction occur in Fungi? (4) (A-2011)
5. Discuss Land Adaptations of Fungi. (4) (A-2013)

Dera Ghazi Khan Board

1. Narrate the Economic Losses of Fungi. (4) (A-2010)
2. Give the economic loss due to fungi with refrence to animal diseases (4) (A-2013)

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Lahore Board

1. Give the disease cycle of loose smut of wheat caused by *Ustilago tritici*. (5) (A-2006)
2. Give at least three medicinal benefits of Fungi. (4) (A-2008)
3. Explain Mutualistic Nutrition in Fungi. (4) (A-2009)
4. Discuss different methods of Asexual Reproduction in Fungi. (4) (A-2011)
5. Explain taxonomic status of Fungi. (4) (A-2012)
6. What do you know about nutrition in Fungi? (4) (A-2012)
7. Draw and explain the life cycle of *Rhizopus*. (4) (Group I-A-2013)
8. Describe life cycle of loose smut of wheat with the help of diagram. (4) (Group II-A-2013)

Gujranwala Board

1. Describe asexual reproduction in fungi. (4) (A-2008)
2. Give the beneficial importance of Fungi. (4) (A-2010)
3. Explain various economic gains due to Fungi. (4) (A-2011)
4. Explain "Sexual Reproduction in Fungi". (4) (A-2012)
5. Write any four economic gains due to fungi. (4) (A-2013)

Rawalpindi Board

1. Write a detailed note on Ascomycota (Sac Fungi). (4) (A-2010)
2. What is Ecological Importance of Fungi? (4) (A-2012)
3. Write down four economic gains due to fungi. (4) (A-2013)

Sargodha Board

1. What are Economic Gains due to Fungi? (4) (A-2010)

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|-------|--|-----|-----|
| 2. | Explain Mutualistic Nutrition in Fungi. | (4) | (A- |
| 2011) | | | |
| 3. | Explain methods of reproduction in Fungi. | (4) | (A- |
| 2012) | | | |
| 4. | Describe four economic gains due to fungi. | (4) | (A- |
| 2013) | | | |

Faislabad Board

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|-------|--|-----|-----|
| 1. | Give an account of Ascomycetes. | (4) | (A- |
| 2010) | | | |
| 2. | Draw life cycle of <i>Rhizopus</i> . | (4) | (A- |
| 2011) | | | |
| 3. | With the help of diagram discuss the life cycle of <i>Rhizopus</i> . | (4) | (A- |
| 2013) | | | |

Chapter No:9

Multan Board

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|-----------|--|--------------------|----------|
| 1. | Discuss in detail the life cycle of Pinus. | (8) | |
| (A-2007) | | | |
| 2. | Define alternation of generation. How has seed been evolved? | (1+7) | |
| | | (Model Paper-2006- | |
| 08) | | | |
| 3. | Discuss life cycle of an Angiosperm with the help of diagram. | (8) | (A- |
| 2008) | | | |
| 4. | Illustrate and explain Evolution of Leaf. | (8) | (S- |
| 2008) | | | |
| 5. | Discuss the life cycle of an Angiosperm. | (4) | (A- |
| 2009) | | | |
| 6. | How seed was evolved in Plants? | (5) | (S- |
| 2009) | | | |
| 5. | Discuss the life cycle of an Angiosperm. | (4) | (A- |
| 2009) | | | |
| 6. | How seed was evolved in Plants? | (5) | (S- |
| 2009) | | | |
| 7. | Describe different steps involved in the evolution of Megaphyll. | (4) | (A- |
| 2010) | | | |
| 8. | What is alternation of generations? Explain it with special reference to Bryophytes. | | |
| | | (4) | (S- |
| 2010) | | | |
| 9. | Describe the Evolution of Seed. | (8) | (S- |
| 2011) | | | |
| 10. | Write a short note on "Evolution of Leaf". | (4) | (A- |
| 2012) | | | |
| 11. | Write a note on life cycle of Adiantum with the help of diagram. | (4) | (A-2013- |
| New) | | | |
| 12. | Sketch the diagram of life cycle of Adiantum. | (4) | (A- |
| 2013-Old) | | | |

Bahawalpur Board

1. Write down Floral Characters of family Rosaceae. (4) (A-2008)
2. Write down the Economic Importance of family Poaceae. (5) (A-2009)
3. Illustrate the Economic Importance of Solanaceae. (4) (A-2010)
4. Write a note on Sphenopsida. (4) (A-2012)
5. Describe adaptive characters of bryophytes for terrestrial environment. (4) (A-2013)

Dera Ghazi Khan Board

1. Discuss the Evolution of Megaphyll (Many Veined Leaf). (4) (A-2009)
2. Describe the Evolution of Seed Habit. (4) (A-2010)
3. Describe Evolution of Leaves. (4) (A-2011)
4. Write down the Economic Importance of family Solanaceae. (4) (A-2012)
5. Describe the evolution of Megaphyll leaf. (4) (A-2013)

Lahore Board

1. Define and explain alternation of generation in Bryophytes. Also give its significance. (8) (A-2007)
2. Explain the Floral Characters of family Solanaceae. (4) (A-2008)
3. Discuss in detail the life cycle of *Adiantum* and also sketch it. (8) (A-2009)
4. Write main steps of Evolution of Seed. (3) (A-2010)
5. Describe Vegetative and Floral Characters of Rose Family (Rosaceae). (4) (A-2011)
6. Explain life cycle of an angiosperm plant. (4) (Group I-A-2013)
7. Describe different steps involved in the evolution of Megaphyll. (4) (Group II-A-2013)

Gujranwala Board

1. What are the details of Double Fertilization? Discuss its significance. (4) (A-2006)
2. Discuss various steps involved in the Evolution of Seed Habit. (4) (A-2008)
3. Explain the life history of *Adiantum*. (Fig. not required) (5) (A-2009)
4. Describe the adaptations of Bryophytes to land habitat. (4) (A-2010)
5. Discuss various steps involved in the Evolution of Seed Habit. (8) (A-2011)
6. Explain the Evolution of Seed. (4) (A-2012)
7. Give the list of various steps involved in the evolution of seed habit. Discuss any two. (4) (A-2013)

Rawalpindi Board

1. Write a note on Evolution of Leaf. (4) (A-2010)
2. Describe Evolution of Leaf. (4) (A-2011)
3. Draw labelled diagram of life cycle of Angiosperm Plants. (4) (A-2013)

Sargodha Board

1. Describe Evolution of Leaf. (4) (A-2010)
2. Explain the life cycle of Adiantum with the help of diagram. (4) (A-2011)
3. Define and explain alternation of generation of generations in bryophytes with its significance. (4) (A-2013)

Faislabad Board

1. How Evolution of Seed occurs? Explain (8) (A-2008)
2. Describe Economic Importance of family Poaceae. (4) (A-2009)
3. Describe the Economic Importance of family of Poaceae. (4) (A-2010)
4. Write down Economic Importance of family Rosaceae. (4) (A-2011)
5. What are adaptive characters of Bryophytes to Land Habitat? (4) (A-2012)
6. What is alternation of generation? Give its significance. (4) (A-2013)

Chapter No:10

No Essay Type Question According to New Pattern

Chapter No:11

Multan Board

1. Describe various steps involved in the Glycolysis. (8) (A-2007)
2. Sketch Krebs's Cycle and discuss its energy yielding steps. (5) (S-2007)
3. Discuss Light Dependent Reactions of Photosynthesis. (8) (Model Paper-2006-08)
4. Explain various steps of Glycolysis in Cellular Respiration. (8) (S-2008)
5. Draw and explain Respiratory Electron Transport Chain. (4) (S-2010)
6. Write a detailed note on Krebs's Cycle or Citric Acid Cycle. (8) (A-2011)
7. Explain Dark Reaction of Photosynthesis. (5) (S-2011)
8. Write Mechanism of Light -Dependent Reactions. (8) (A-2012)

9. Sketch and explain the Krebs's Cycle. (4) (A-2013-New)

Bahawalpur Board

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|--|-------|----------|
| 1. Write notes on: | (4+4) | (A-2007) |
| i) Chemiosmosis | | |
| ii) Carotenoids-Acessary Pigments | | |
| 2. Write note on Alcholic Fermentation and Lactic Acid Fermentation. | (4) | (A-2008) |
| 3. Describe Dark (Light Independent) Reaction. | (8) | (A-2008) |
| 4. Sketch and explain the process of Glycolysis. | (8) | (A-2009) |
| 5. Describe and sketch Light Independent (Dark) Reactions of Photosynthesis. | (8) | (A-2011) |
| 6. Describe process of Glycolysis. | (8) | (A-2012) |
| 7. Write a note on Respiratory Chain | (4) | (A-2013) |

Dera Ghazi Khan Board

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|---|-----|----------|
| 1. Give an account of Light Independent Reaction of Photosynthesis. | (4) | (A-2008) |
| 2. Discuss Non-Cyclic Phosphorylation with the help of diagram. | (8) | (A-2009) |
| 3. Explain the process of Glycolysis with the help of diagram. | (8) | (A-2011) |
| 4. Sketch and describe calvin cycle. | (4) | (A-2013) |

Lahore Board

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|---|-----|-------------------|
| 1. Define Bioenergetics. Also describe the role of photosynthesis and respiration in Bioenergetics. | (6) | (A-2006) |
| 2. Define Glycolysis and explain it with the help of sketch. | (8) | (A-2007) |
| 3. Explain Krebs's Cycle and sketch its various steps. | (8) | (A-2008) |
| 4. Write a note on Lactic Acid Fermentation. | (3) | (A-2009) |
| 5. What is Glycolysis? Give its outline. | (4) | (A-2010) |
| 6. Explain and sketch Krebs's Cycle and discuss its energy yielding steps. | (8) | (A-2012) |
| 7. Sketch and describe metabolic pathway of glycolysis. | (4) | (Group I-A-2013) |
| 8. Describe cyclic phosphorylation with the help of a diagram. | (4) | (Group II-A-2013) |

Gujranwala Board

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|--|-----|----------|
| 1. Describe Non-Cyclic Phosphorylation during Light Dependent Reaction (Z-Scheme). | (5) | (A-2006) |
| 2. Sketch Krebs's Cycle and discuss its energy yielding steps. | (8) | (A-2007) |

3. What is Photophosphorylation? Explain Non-Cyclic Photophosphorylation. (4)
(A-2008)
4. Simply give the outline of the Kreb's Cycle. (No Description) (3) (A-2009)
5. Sketch the Kreb Cycle. (4)
(A-2010)
6. Explain "Respiratory Electron Transport Chain" with the help of diagram (Sketch). (4) (A-2011)
7. Write the process of Non-Cyclic Phosphorylation. (4) (A-2012)
8. Elaborate the non-cyclic phosphorylation with the help of a diagram. (4)
(A-2013)

Rawalpindi Board

1. Describe the structure of Chloroplast with the help of a diagram. (4)
(A-2012)
2. Give an account of Glycolysis with the help of diagram. (8)
(A-2011)
3. Explain the process of Glycolysis. (4)
(A-2012)
4. Write a note on Non-Cyclic Phosphorylation. (4) (A-2013)

Sargodha Board

1. Give an account of Cyclic Phosphorylation. (4) (A-2010)
2. Draw and describe Cycle Cycle in Photosynthesis. (4) (A-2013)

Faislabad Board

1. Only draw the outline of Kreb's Cycle. (4) (A-2009)
2. Construct an outline for Glycolysis. (4) (A-2010)
3. Explain Calvin Cycle with the help of diagram as it occurs in Photosynthesis.
4. Explain Kreb's cycle with the help of diagram. (4) (A-2013)
(8) (A-2012)

Chapter No:12

Multan Board

1. Give detailed account of Food Poisoning and Bulimia Nervosa. (8) (A-2009)
2. Draw and explain the structure and roles of Human Stomach in Digestion. (8)
(S-2009)
3. Describe digestion of food in Oral Cavity of Man. (5) (S-2010)
4. Describe any two common diseases related to nutrition. (4) (A-2013-New)
5. Describe digestion in small intestine. (4) (A-2013-Old)

Bahawalpur Board

1. Describe the structure and functions of the Human Stomach. (8)
(A-2010)
2. Explain absorption of Food in Small Intestine. (4)
(A-2013)

Dera Ghazi Khan Board

1. Give Digestion in Amoeba. (4)
(A-2008)
2. Describe briefly the process of nutrition in Insectivorous Plants. (3)
(A-2010)
3. Explain digestion in oral cavity of man. (4) (A-2013)

Lahore Board

1. Explain process of Digestion in Hydra. (5) (A-2006)
2. Describe the process of Digestion in Amoeba. Explain diagrammatically. (5)
(A-2009)
3. Write a note on Digestion in Oral Cavity of Man. (4) (A-2010)
4. Describe Digestion in Small Intestine of Man. (4) (A-2011)
5. Explain the process of Digestion in Cockroach. (4) (A-2012)
6. Discuss any four methods of nutrition in animals. (4) (Group I-A-2013)
7. Describe the role of pancreas and liver in food digestion in humans. (4) (Group II-A-2013)

Gujranwala Board

1. Discuss digestion in Stomach of Man. What is Heart Burn? (6) (A-2006)
2. Give the role of Large Intestine in Human being. (5)
(A-2009)
3. Explain the role of Small Intestine in the Absorption of Food in Man. (4) (A-2010)
4. Describe Digestion in Stomach of Man. (4) (A-2012)
5. Describe any four methods of animal nutrition. (4) (A-2013)

Rawalpindi Board

1. Write a note on Large Intestine of Man. (4) (A-2010)
2. Write down a note on Peristalsis. (4) (A-2011)
3. Explain process of Digestion and Absorption in Small Intestine of Man. (4) (A-2012)
4. Explain digestion in the oral cavity of man. (4) (A-2013)

Sargodha Board

1. Explain the process of Food Absorption in Small Intestine of Man. (4) (A-2010)
2. Describe Digestion in Small Intestine along with Absorption of Food. (4) (A-2012)
3. Give Digestion in Cockroach. (4) (A-2013)

Faislabad Board

1. Give different methods of Nutrition in Animals. (8) (A-2007)
2. Give an account of Digestion in Human Stomach. (4) (A-2009)
3. Describe Functions of Oral Cavity of Human. (4) (A-2010)
4. Explain Digestion in Oral Cavity of Man. (4) (A-2011)
5. Explain Digestion in the Stomach of Man. (4) (A-2012)
6. Write a note on obesity and dyspepsis. (4) (A-2013)

Chapter No:13

No Essay Type Question According to New Pattern

Chapter No:14

Multan Board

1. Discuss the Evolution of Vertebrate Heart. (8) (Model Paper-2006-08)
2. Write a note on Blood Cells and Cell like Bodies. (8) (A-2008)
3. Describe the Blood's Plasma in detail. (5) (S-2009)
4. Describe one theory about Ascent of Sap. (5) (A-2010)
5. Draw neat and labelled diagram of Human Heart. (4) (S-2010)
6. What are two Hypotheses about Opening and Closing of Stomata? (4) (S-2011)
7. Describe Lymphatic System. Also write down its various functions. (8) (A-2012)
8. Discuss Cohesion Tension Theory for the ascent of sap in plants. (4) (A-2013-New)
9. Compare the structure and function of an artery, vein and capillary. (8) (A-2013-Old)

Bahawalpur Board

1. Define Transpiration. Describe two hypotheses which may explain the Opening and Closing

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|--|-----|----------|
| of Stomata. | (8) | (A-2007) |
| 2. Explain the Human Cardiac Cycle. | (3) | (A-2009) |
| 3. Explain uptake of water by Roots. | (5) | (A-2010) |
| 4. Write in detail the functions of Lymphatic System. | (4) | (A-2011) |
| 5. Define Transpiration. What are different factors affecting the rate of Transpiration? | (8) | (A-2012) |
| 6. Explain Lymphatic System of Man. | (4) | (A-2013) |

Dera Ghazi Khan Board

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|--|-----|----------|
| 1. Write the types of Immunity. | (4) | (A-2008) |
| 2. Describe Mechanism of Opening and Closing of Stomata in plants by K ⁺ influx method. | (4) | (A-2009) |
| 3. Distinguish between Closed and Open Blood Circulatory System. | (4) | (A-2011) |
| 4. Explain the factors affecting rate of Transpiration. | (4) | (A-2012) |
| 5. What is plasma? Describe its various components | (4) | (A-2013) |

Lahore Board

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|--|-----|-------------------|
| 1. Define Transpiration. Describe the mechanism of Opening and Closing of Stomata. | (8) | (A-2008) |
| 2. Discuss Transpiration as a Necessary Evil. | (4) | (A-2009) |
| 3. Illustrate the Mechanism of Opening and Closing of Stomata. | (8) | (A-2010) |
| 4. Transpiration is Necessary Evil. Comment. | (4) | (A-2011) |
| 5. Write structure and function of Human Heart. | (8) | (A-2012) |
| 6. How influx of K ⁺ ions explain the Opening and Closing of Stomata. | (4) | (A-2012) |
| 7. Describe Cohesion Tension Theory and Root Pressure Theory of Ascent of Sap. | (8) | (A-2012) |
| 8. Discuss transpiration as necessary evil. | (4) | (Group I-A-2013) |
| 9. List functions of blood (any eight). | (4) | (Group II-A-2013) |

Gujranwala Board

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|---|-----|----------|
| 1. Write a note on Erythrocytes. | (4) | (A-2006) |
| 2. What is Transpiration? Give the Factors Affecting the Rate of Transpiration. | (8) | (A-2008) |
| 3. Compare and contrast the Closed and Open Circulatory System. | (4) | (A-2009) |
| 4. Explain the phenomenon of Root Pressure. | (4) | (A-2011) |
| 5. Define immunity. Describe various types of immunity. | (4) | (A-2013) |

Rawalpindi Board

1. Explain Lymphatic System in Man. (4) (A-2010)
2. Describe various function of the Blood. (4) (A-2011)
3. Describe any two hypotheses about Opening and Closing of Stomata. (4) (A-2012)
4. Explain Leukemia and Thalassaemia. (4) (A-2013)

Sargodha Board

1. Write a detailed note on Blood Cells. (8) (A-2010)
2. Explain different hypothesis to explain Opening and Closing of Stomata. (4) (A-2012)
3. Write a note on Cardiac Cycle. (4) (A-2013)

Faislabad Board

1. Compare the transport system between Earthworm and Cockroach. (8) (A-2007)
2. Give the functions of Lymphatic System. (4) (A-2008)
3. Write a note on Oedema. (4) (A-2009)
4. Draw label and explain the structure of Human Heart. Also describe the flow of blood through the Heart. (8) (A-2010)
5. What is Lymphatic System? Describe functions performed by the Lymphatic System. (8) (A-2011)
6. What is Transpiration? Describe its different types. (4) (A-2012)
7. Write a note on major types of immunity. (4) (A-2013)

SECTION IV

Questions relating to Practicals

Each question carries 5 Marks

Q. to be asked 5
attempted 3

Q. to be

Total Marks: $5 \times 3 = 15$

Section IV of Questions relating to Paracticals consists of five questions i.e Q10, Q11, Q12, Q.13 and Q.14. Only any three questions are to be attempted. Each question may or may not have two parts "a" and "b".

Model Paper of Multan Board Session 2012-2013 and onwards

Section IV

Attempt any three questions.

(5x3=15)

- Q10. (a) You are provided with egg albumin and Millon reagent. Write
biochemical test for the substance which egg contain. (3)
(b) Write two examples of reducing sugars. (2)
- Q11. (a) You are given the flower *Rosa indica*, describe in technical terms its
following parts. (3)
i) Calyx ii) Androcium iii) Gynacium
(b) Differentiate between Polysepalous and Gamosepalous. (2)
- Q12. Sketch and label the diagram of digestive system of Cockroach. (5)
- Q13. (a) Write the procedure to measure the blood pressure during rest and after exercise. (3)
(b) Write normal value of systolic and diastolic blood pressure (2)
- Q14. Following specimens were studied in the laboratory. Give one character of each to identify. (5)
i) Euglena ii) Anaphase of Mitosis iii) Fungi
iv) Stomata v) Male cone of Pinus

Distribution of Questions relating to Paracticals to be asked

1. One question is asked to draw the Labeled Diagram of a System of

Animals and their Systems

- | | |
|---------------|-----------------------|
| (A) Frog | 1. Digestive System |
| | 2. Respiratory System |
| | 3. Heart |
| | 4. Arterial System |
| | 5. Venous System |
| (B) Cockroach | 6. Digestive System |

1. Digestive System of Frog

2. Respiratory System of Frog

4. Heart of Frog

4. Arterial System of Frog

5. Venous System of Frog

6. Digestive System of Cockroach

2. One question is asked to describe one of the following five flowers in technical terms. One question is also asked about these terms. (3+2 Marks)

1. *Rosa indica*

- 1. **Common Name:** Rose, Gulab
- 2. **Family Name:** Rosaceae
- 3. **Inflorescence:** Large terminal or axillary solitary flower
- 4. **Flower Description:** Bracteate (bracts rarely persistent), Pedicellate, Complete, Hermaphrodite, Actinomorphic, Perigynous
- 5. **Calyx:** Five Sepals, Gamosepalous
- 6. **Corolla:** Five or multiple of five usually indefinite Petals, Polypetalous
- 7. **Androecium:** Indefinite Stamens, Polyandrous
- 8. **Gynacium:** Polycarpellary usually indefinite, Apocarpous, Superior Ovary
- 9. **Floral Formula:** -

2. *Solanum nigrum*

- 1. **Common Name:** Mako, Night shade

- 2. **Family Name:** Solanaceae
- 3. **Inflorescence:** Extra-axillary Scorpid Cyme or Rhipidium of Uniparous Cyme (a modified Cyme)
- 4. **Flower Description:** Ebracteate, Pedicellate, Complete, Hermaphrodite, Actinomorphic, Hypogynous
- 5. **Calyx:** Five Sepals, Gamosepalous
- 6. **Corolla:** Five Petals, Gamopetalous
- 7. **Androcium:** Five Stamens, Polyandrous, Epipetalous
- 8. **Gynacium:** Bicarpellary, Syncarpous, Superior Ovary
- 9. **Floral Formula:** -

3. *Cassia fistula*

- 1. **Common Name:** Amaltas, Golden Shower
- 2. **Family Name:** Fabaceae, Sub-family-Caesalpinnaceae
- 3. **Inflorescence:** Racemose, An Axillary long Pendulous Comound Raceme or Panicle
- 4. **Flower Description:** Bracteate, Pedicellate, Complete, Hermaphrodite, Zygomorphic, Slightly Perigynous
- 5. **Calyx:** Five Sepals, Polysepalous
- 6. **Corolla:** Five Petals, Polypetalous
- 7. **Androcium:** Ten Stamens arranged in two whorls, Polyandrous, Stamens

- are of unequal sizes of following groups:
 - i. Three lowest stamens with curved filaments and large anthers
 - ii. Four lateral stamens with shorter anthers
 - iii. Three upper or posterior staminoid or much reduced stamens
- 8. **Gynacium:** Monocarpellary, Superior Ovary
- 9. **Floral Formula:** -

4. *Lathyrus odoratus*

- 1. **Common Name:** Phool Matar, Sweet Pea
- 2. **Family Name:** Fabaceae, Sub-family-Papilionaceae
- 3. **Inflorescence:** Solitary axillary or Pedunculate Raceme
- 4. **Flower Description:** Bracteate, Pedicellate, Complete, Hermaphrodite, Zygomorphic, Slightly Perigynous
- 5. **Calyx:** Five Sepals, Gamosepalous
- 6. **Corolla:** Five Petals, Papilinaceous. There is large posterior petal called Standard, two lateral petals called Wings and two inner petal fused to form Keel which encloses stamens and carpels.
- 7. **Androcium:** Ten Stamens arranged in two groups (Diadelphous), Filaments of nine stamens united to form a tube around the pistil, 10th free stamen is posterior
- 8. **Gynacium:** Monocarpellary, Superior Ovary
- 9. **Floral Formula:** -

5. *Avena sativa*

- 1. **Common Name:** Oat or Jangli Jai

| | | |
|----|---------------------------|---|
| 2. | Family Name: | Gramineae or Poaceae |
| 3. | Inflorescence: | A panicle of Spikelets |
| 4. | Flower Descriptio: | Bracteate (Bract is represented by inferior palea with hair like Awn and the bracteole is represented by superior palea), |
| | | Sessile, Incomplete, Hermaphrodite, Zygomorphic, Hypogynous |
| 5. | Perianth: | Two scale like Perianth leaves called Lodicules which are present on short axis within the two palea. |
| 7. | Androcium: | Three Stamens, Polyandrous |
| 8. | Gynacium: | Monocarpellary, Superior Ovary |
| 9. | Floral Formula: - | |

Terms to Know

(A) Technical terms used to describe Angiosperm flowers:

| | |
|--|--|
| Pedidel: | A stalk which attaches the flower with stem |
| Pedicellate: | Flower with a stalk or pedicel |
| Sessile: | Flower without pedicel and is directly attached to the stem. |
| Subsessile: | Flower having very small pedicel |
| Bract: | A small leaf present in the axil of flower |
| Bracteate: | Flower arising in the axil of a bract |
| Ebracteate: | Flower without a bract |
| Complete: | Flower having all four types of floralar leaves |
| Incomplete: | Flower without one of the four types of floral leaves |
| Hermaphrodite/ Bisexual/ Perfect: | Flower having both stamens and carpels |
| Unisexual/ Imperfect: | Flower with either stamens or carpels noth both |
| Saminate: | Flower having stamens but no carpels |
| Pistillate: | Flower having carpels but no stamens |
| Symmetrical: | A flower which can be divided into two equal part from any vertical plane |
| Asymmetrical: | A flower which can not be divided into twoequal halves from any vertical plane |
| Actinomorphic: | Flower which can be cut into two equal parts in more than one planes |
| | Or |
| | A flowerwhich can be divided into two equal halves from two vertical planes |
| Zygomorphic: | A flower which can be divided into two equl parts or halves only only one vertical plane |
| Trimorous: | The floral leaves are either three or multiple of three |
| (Monocot | plants) |
| Pentamerous: | The floral leaves are either five or multiple of five (Dicot plants) |
| Hypogynous: | Flower in which ovary of carpel occupies the hight position on |
| such | conical or convex thalamus while the rest of floral whorls |
| ovary | as sepal, petals and stamens are borne below the level of |

| | |
|--------------------|--|
| Epigynous: | Flower in which ovary with carpel lies in the base of cup like thalamus while rest of the floral members such as sepal, petals and stamen at the tip of thalamus above the ovary |
| Perigynous: | Flower with flattened thalamus and ovary lies in the centre mid way to hypoand epi-gynous |

(B) Terms used for Calyx:

| | |
|----------------------|--|
| Calyx: | A whorl of sepals |
| Sepaloid: | Sepals of green color |
| Petaloid: | Sepals of any color except green |
| Polysepalous: | Sepals are free from one another |
| Gamosepalous: | Sepals are partially or completely fused |
| Companulate: | Sepals are fused to form bell like structure |
| Number: | Number of sepals present |

(C) Terms used for Corolla:

| | |
|------------------------|--|
| Corolla: | A whorl of petals |
| Sepaloid: | Petals green in color |
| Petaloid: | Petals of any color except green |
| Polypetalous: | Petals are free from one another |
| Gamopetalous: | Petals are partially or completely united |
| Number: | Number of petals present |
| Papilionaceous: | Corolla consists of five petals. One very large forming standard, two smaller laterally situated called alae or wings and two inner ones united to form a boat shaped keel |
| Companulate: | Petals are united forming a bell shaped structure |
| Rotate: | The corolla forms a wheel shaped structure |

(D) Terms used for Perianth:

| | |
|----------------------|--|
| Perianth | It is a collective name for petals and sepals when they are similar in shape and color to each other and can not be differentiated from each other |
| Sepaloid: | Perianth leaves are green |
| Petaloid: | Perianth leaves are of any color except green |
| Polyphyllous: | Peranth leaves are free |
| Gamophyllous: | Perianth leaves are fused |
| Number: | Number of perianth leaves present |

(E) Terms used for Androcium:

| | |
|-----------------------|---|
| Number: | Numberof stamens present |
| Polyandrous: | Stamens are free from one another |
| Adelphous: | Stamens with their filaments fused to one another (anthers remain free) |
| Monoadelphous: | Stamens united by their filaments into a single group |
| Diadelphous: | Stamens are united by their filaments into two groups |
| Polyadelphous: | Stamens are united by their filaments into several groups |
| Didynamous: | Stamens four in numbers, two long and two short in a single whorl |
| Tetradynamous: | Stamens six in numbers, four long and two short in two whorls |
| Epipetalous: | Stamens are attached to the petals |
| Basifixed: | Filaments are attached from the base of anthers |

| | |
|--------------------|--|
| Dorsifixed: | Filaments are attached from the doesal side of anthers |
| Versatile: | Anthers long and capable of making swinging movement with the filament |

(F) Terms used for Gynoacium:

| | |
|-------------------------------|---|
| Monocarpellary: | Gynoacium with one carpel or pisitil |
| Bicarpellary: | Gynoacium consisting of two carpels or pistils which may be free or united |
| Tricarpellary: | When the gynoecium consists of three carpels which may be free or united |
| Polycarpellary: may | When the gynoecium consists of severals carpes which be free or united |
| Apocarpous: simple | Carpels are more than one, all free each forming a ovary, one style and a stigma |
| Syncarpous: | Carpals are more than one, uinted to form a single compound ovary |

(G) Terms used for Placentation:

| | |
|-------------------------------------|--|
| Placentae: | Ridges of tissue on the inner side of ovary wall to which ovule or ovules become attached |
| Placentation: wall | Arrangement of Placentae on the inner side of ovary |
| Marginal: the | Gynoecium is monocarpellary or polycarpellary and apocarpous, so that ovary is simple and unilocular. The ovules are attached to to the placenta developed along ventral suture |
| Parietal: | The ovary is compound formed by fusion of two or more carpels, by their adjacent margins. The placentae developing along the united margins of the ovaries |
| Axile: | Pistil polycarpellary, syncarpous and multilocular. The fused margins of the carpel run inwards and meet in the centre of the ovary forming column on which placentate are developed |
| Basal: and bearing | Gynoecium uni or bicarpellary, ovary one chambered the placentae developing at the base of the ovary single ovule |

(H) Floral Formula:

| | |
|-----------------------|------------|
| Zygomorphic | |
| Actinomorphic | |
| Bisexual | |
| Staminate | |
| Calyx number | K (number) |
| Polysepalous | K number |
| Gamosepalous | K (number |
| Corolla number | C (number) |
| Polypetalous | C number |

| | |
|--------------------------|------------|
| Gamopetalous | C (number) |
| Perianth number | P (number) |
| Polyphyllous | P number |
| Gamophyllous | P (number) |
| Androecium number | A (number) |
| Polyandrous | A number |
| Stamens fused | A (number) |
| Gynacium number | G (number) |
| Apocarpous | G number |
| Syncarpous | G (number) |
| Ovary superior | G |
| Epipetalous | C A |

(I) How to describe a Flower:

Flower:

- (a) Pedicillate or sessile
- (b) Bracteate or ebracteate
- (c) Actinomorphic or zygomorphic
- (d) Unisexual or bisexual (hermaphrodite)
- (e) Complete or incomplete
- (f) Hypogynous, perigynous or epigynous
- (g) Color of the flowers

Calyx:

- (a) Number of sepals
- (b) Polysepalous or gamosepalous
- (c) Sepaloid or petaloid
- (d) Inferior or superior

Corolla:

- (a) Number of petals
- (b) Poly or gamopetalous
- (c) Color of the petals
- (d) Inferior or superior

Androecium:

- (a) Number of stamen, 1 to 10 or indefinite
- (b) Polyandrous (free) or fused. If fused monadelphous, di or polyadelphous
- (c) Epipetalous, epiphyllous or free from petals
- (d) Fixation of anthersbasifixed, dorsifixed or veatile

Gynacium:

- (a) Number of carpels
- (b) Apocarpous or syncarpous
- (c) Ovary superior or inferior
- (d) Placentation-marginal, parietal, axile, basal

Flora formula:

(J) Terms used for Inflorescence:

| | |
|---------------------------------------|---|
| Inflorescence: | The mode of branching of floral axis having a group of flowers |
| | Or |
| | The arrangement of flowers on the floral axis and may be simple, compound, mixed or of special type |
| Peduncle: | Main axis of inflorescence |
| Racemose: | Main axis is never terminated in flower and gives off flowers laterally |
| Cymose or Cyme: | Main axis terminates in flower and continuity of inflorescence depends on the activity of lateral buds |
| Raceme: | Racemose type, elongated peduncle with pedicillate and bisexual flowers |
| Spike: | Racemose type, elongated peduncle with sessile and bisexual flowers |
| Catkin: | Racemose type, elongated peduncle with sessile and unisexual flowers |
| Corymb: | Racemose type, Shortened Peduncle with Pedicels of unequal length, lower flowers have long pedicels and upper flowers have small pedicels, all flowers reaching at the same level |
| Umbel: | Racemose type, Shortened Peduncle, Flowers with Pedicels of same length and appear to arise from the common point |
| Capitulum or Head: | Racemose type, Peduncle suppressed becoming almost flat with two types of florets, ray florets at margin and disc florets at the centre all appears to be a single flower with green bracts at the base |
| Spikelet: | Raceemose type, three bracts at its base called glumes, the lower two without flowers are called empty glumes, the third glume has flower in its axil called lemma, just opposite to lemma is small bracteole palea |
| Uniparous or Monochasial Cyme: | Cymose type, main axis ends in a flower, only one lateral branch at a time ending in a flower, succeeding later branches follw the same mode of producing flowers |
| Scorpid Cyme: | Kind of unipaarous cyme, main axis ends into a flower, produces only one lateral branch, succeeding branches are produced on alternate sides |
| Helicoid Cyme: | Kind of uniparous cyme, main axis ends into a flower, produces only one lateral branch, succeeding branches are produced on same sides |
| Biparous Cyme/ Dichasial Cyme: | Cymose type, main axis ends into a flower and produces two lateral axes, each of the two daughter axes again ends in a flower and produces two daughter axes which continue to branch in the same way |

3. One question is asked about one character each of the five specimens from following specimen. (1x5=5)

1. **Leucosolenia** -- Cylindrical individuals united at their base by horizontal tubes
2. **Venus Flower** -- Basket- Cylindrical and curved body of glass frame work
3. **Penicillium**--- Vertical hyphae with brush like arrangement of blue green conidia
4. **Ulva**-- Sheet like body with two layers of cells and wavy margins
5. **Chlorella**--- Spherical body with thick cell wall and cup-shaped chloroplast
6. **Nostoc**---- Cells are placed end to end, mostly are oval but some are barrel shaped called Heterocysts, all are enclosed within Macilagenous sheath forming a Trichome
7. **Euglena**--- Elongated, spindle-shaped body with two flagella, stigma, cytopharynx, reservoir, contractile vacuule and chloroplasts
8. **Fungi**--- Body is called Mycelium which consists of thread like hyphae with cytoplasm surrounded by cell wall made up of chitin, some fungi are unicellular and non-hyphal
9. **Male cone of Pinus**-- Small in size of about one inch in length with a large number of one type of microsporophyll scales bearing microsporangia
10. **Female cone of Pinus**--- Large woody cone with two types of megasporophyll scales i.e.thick ovuliferous scales and thin bract scales bearing megasporangia
11. **T. S of Bifacial leaf**-- Upper epidermis with thick cuticle and without stomata, Lower epidermis with thin cuticle and stomata surrounded by guard cells, vascular bundle in the middle, Palisade mesophyll cells near the upper epidermis and spongy mesophyll cells below the Palisade mesophyll cells having air spaces
12. **Onion epidermis**- Cells are rectangular in shape with rounded or oval nucleus found on one side near the cell membrane or in the centre, No chloroplast, Cells fit tightly together
13. **Cells of skin of frog**-- Flattened, roughly six sided, closely fitted together without intracellular spaces
14. **Cells of Buccal cavity of frog**-- Columnar or cylindrical cells with one broader end than other, distinct nucleus and cilia at their free ends
15. **Jelly Fish or Aurelia**--Bowl shaped body of about 3-4 inches in diameter with four oral arms
16. **Leech**-- Cylindrical body whose dorsal surface is more convex than ventral and has additional annuli, oral and ventral suckers
18. **Mesophyll cells**--- Two types of mesophyll cells, Palisade cells are rectangular in shape arranged in layers below upper epidermis, Spongy cells among air spaces with irregular shapes
19. **Stomata**-- Plural form of Stoma, Each stoma is surrounded by two bean-shaped guard cells, the only cells in the lower epidermis which contain chloroplasts
20. **Amoeba**-- Irregular body with temporary finger like pseudopodia, clear ectoplasm and granular endoplasm containing distinct nucleus, contractile vacuule
21. **Entamoeba histolytica** -- Trophozoite has permanent short blunt Pseudopodium, distinct nucleus and ingested RBCs
22. **Plasmodium**-- Among many stages of Plasmodium Trophozoite in the RBC of human is identified which is a ring with large vacuole

23. **Volvox --** is surrounded by cytoplasm with nucleus
Spherical colony of biflagellate cells with cytoplasmic connections and is surrounded by macilagenous sheath, have
24. **Paramecium-** daughter colonies
Slipper like body with anterior round and posterior pointed end, cilia around the whole bdy, has two nuclei, contractile vacuole, cytostome etc.
25. **Stentor --** Bell-shaped body with cilia, contractile vacuole, micro and mega nuclei and a stalk attached to substratum
26. **Chlamydomonas-** Pear-shaped Body with Cupshaped Chloroplast, Two Flagella, Nucleus, Pyramid and Pigment Spot
27. **Millipede-** Dorsoventrally flattened body with a head and many segemented body, two pairs of jointed legs in each segment
28. **Scorpion--** Body with seven segmented pre abdomen bearing legs and pedipalp and five segmented post abdomen with sting
29. **Sycon or Sypha-** Vase-shaped cylindrical individuals of about 1-3 inches in length connected at base with oscula encircled by spicules
30. **Sea Anemone-** Cylendrical body of about 8 cm in length with over expanded oral disc containing mouth and short tentacles, cylindrical column and a flattened pedal or basal disc
31. **Hydra-** Cylendrical body of about 1-3 cms with cylinder stalk, basal disc and 6-10 tentacles
32. **Obelia-** Hollow thread like hydrrrhiza from which arise a hollow vertical branching stem bearing hydranth, blastostyles and mudsa buds (zooids)
33. **Trypanosoma-** Cylendrical curved body, with central nucleus, kinotoplast etc, that tapers at both ends, single flagellum running from posterior to anterior end of the body and is attaced to the body
34. **Centipede--** by undulating membrane
Dorsoventrally flattened body with many segemented trunk and a pair of jointed legs in each segment
35. **Crab-** Body consists of Cephalothorax (Head and thorax fused) and bent Abdomen under the cephalothorac with four pair of legs,
36. **Tape worm--** the first pair is mdified into Pincers, forcep like structure
Dorsoventrally flattened ribbon like segmented body with scolex (head) bearing suckers and with or without hooks
37. **Tenia solium--** Ribbon like body with scolex bearing rostellum (armed with two rows of hooks) and a very long chain of segments called Strobila
38. **T. S of Monocot Stem--** Pith is absent. Vascular bundles are scattered in the ground tissues.
39. **T.S of Dicot Stem-** Pith is well developed. Vascular bundles are arranged in the form of rings.
40. **T.S of Monocot Root--** Pith is present in the centre. There is an alternate arrangement of phloem and xylem in the form of rings.
41. **T.S of Dicot Root--** Pith is central part of root either small or absent. Xylem is in the form of star and phloem in the space between the arms of star.
42. **V.S of Thallus of Marchentia---** It has upper epidermis with air pores, air chambers with photosynthetic tissues, storage tissues and lower epidermis with rhizoids.
43. **L.S of female receptacle of Marchentia--** It shows epidermis with air spaces on the dorsal side, eight arms and rays curving down, inverted flask shaped archegonia on the ventral side.
44. **L.S of male receptacle of Marchentia--** It shows upper epidermis, air spaces on

dorsal surface, flask shaped cavities, alternating air chambers, have anthridia in them

45. **L.S through tip of a male gametophyte of Funaria**—Club-shaped anthridia intermixed with clubshaped paraphyses and leaves surrounding the anthridia are arranged at the tip in open fashion
46. **L.S through tip of a female gametophyte of Funaria-** Flask shaped Archegonia with paraphyses, Leaves, surrounding archegonia, are arranged in a rosette
47. **L.S of Archegonium of Funaria--** A long neck with ten or more canal cells, a large venter with a small venter canal and an oosphere or egg
48. **L.S of mature sporangium of Marchentia--** Foot embedded in receptacle, a stalk and a capsule with spores and elaters
49. **L.S of female cone of Pinus---**Central axis, ovuliferous scales each with two ovules or megasporangia at its base, bract scales
50. **L.S of male cone of Pinus--** Central cone axis, Microsporophylls arranged around the axis, two microsporangia or pollen sacs with spores
51. **T.S of Stomach of Human-** Gastric mucosa thrown into folds or Rugae and with gastric pits, submucosa (athick layer of connective tissue), muscularis mucosa with three types of muscles and serosa, a layer of connective tissue
52. **T.S of small intestine (duodenum) of man--** Mucosa with villi and Crypts of Leiberkuhn (openings of tubular intestinal glands) between villi, submucsa with Burnner’s glands, muscularis externa and serosa
53. **T.S of small intestine (ileum) man--** Mucosa with villi, Crypts of Leiberkuhn and Peyer’s patches, submucosa with no Burnner’s glands and serosa
54. **T.S of large intestine-** Mucosa without villi and with pores of intestinal glands and Peyer’s patches, submucosa without Burnner’s glands, musularis mucosa and serosa
55. **T.S of liver--** Cords of hepatic cells with hexagonal hepatic lobules and arranged radially around central venule, each hepatic lobule has hepatocytes (hepatic cells), canaliculi, Kupffer’s cells, connective sheath (Glisson’s capsule), interlobular arteries & veins and bile ductules
56. **T.S of a capillary--** One cell thick layer of endothelial cells
57. **T.S of an artey--** Tunica adventitia made up of connective tissue and elastic fibers, Tunica media made up of thick muscular tissue and elastic fibers, Tunica intima made up of single layer of cells of endothelium with delicate collagen and elastic fibers, A narrow lumen
58. **T.S of a vein-** Tunica adventia made up of connective tissue and elastic fibers, Tunica media, slightly muscular with few elastic fibers, Tunica intima made up of a layer of endothelial cells, Wide lumen
59. **Ulothrix --** Unbranched filamentous body with a single row of cells, the basal cell of which is finger like and is called hold fast
60. **Cell of Ulothrix -** Each cell has cell wall, a nucleus, a girdle shaped chloroplast with U or C shaped curve and one or more pyrenoids present in the chloroplast.
61. **Blood smear of frog showing red blood cells--** Red blood cells are oval in shape

and have single nucleus in them.

62. **Blood smear of human showing red blood cells--** Biconcave and without nucleus
63. **Blood smear of human showing neutrophils--** Twice the size of RBC with granular cytoplasm and two to five lobed nucleus
64. **Blood smear of human showing eosinophils--** Granular cytoplasm and bilobed nucleus
65. **Blood smear of human showing basophils--** Granular cytoplasm and bilobed nucleus
66. **Blood smear of human showing monocytes--** Two to three times larger than RBC's, clear cytoplasm, round to lobed nucleus
67. **Blood smear showing lymphocytes--** Slightly larger than RBC, clear cytoplasm, very large nucleus occupying the whole cytoplasm
68. **Yeast cell--** Oval shaped cell with three layered wall, large central vacuole, and a large nucleus
69. ***Ustilago*--** Septate hyphae with a large number of black telospores
70. **Gametophyte or Prothallus of *Adiantum*--** Conical or heart shaped with single of cells at margin and multicellular in the middle, notch at the anterior end and rhizoids at the posterior end, archegonia near the notch and antheridia among rhizoids
71. **Leaf of *Adiantum*--** Leaf with a long petiole that forms rachis having bifurcated veins, sori bearing sporangia on the lower surface of leaflet
72. **Sporangium of *Adiantum*--** Each sporangium has a stalk called sporangiophore and a capsule with two types of cells, three fourth thick walled cells forming Annulus and one fourth thin walled stomium cell, spores within it
73. **Male plant of *Marchentia*--** Dorsoventrally flattened and dichotomously branched thallus with antheridiophores having irregular wavy marginal male receptacles
74. **Female plant of *Marchentia*--** Dichotomously branched thallus with archegoniophore having star shaped female receptacles
75. ***Funaria* --** Sporophyte is leaf less with capsule bearing spores, long seta and foot that is embedded in the female gametophyte male and female gametophytes both are leafy and photosynthetic, female gametophyte may bear sporophyte
76. **Sporophyte of *Adiantum* --** It has short thick horizontal underground rhizome from which arise aerial branches which have stipe and rachis with fronds (compound leaves with sporangia) bearing leaflets (pinnae and pinnules) showing dichotomous venation

4. **One question is asked about identification of a biochemical from biological material through different biochemical tests. One question is asked about these tests or biochemical. (3+2)**

Identification of Biochemical from Biological Molecules

A) Biochemical Tests for Proteins

Materials

Test tube, Test tube stand, Test tube holder, Burner

Chemicals

Egg albumen or any other Protein Solution, Millon Reagent, NaOH, CuSO₄

Procedure

Perform the test, take the observations and draw the results.

A) Preliminary Test for Proteins

2 ml of original solution (O.S) is taken in a test tube. The solution is heated on the burner. If cloudy appearance or white ppt appears then it is inferred that Protein may be present

B) Confirmatory Test for Proteins

a) Millon's Test:

2 ml of protein solution is taken in a test tube. Then 2 ml of Millon's reagent is added in the solution. After that solution is boiled. When white precipitate (ppt) appears before boiling protein, it is inferred that protein is present and when brick red color appears after boiling then it is confirmed that Protein is present.

b) Biuret Test:

2 ml of O.S is taken in a test tube in which 3 ml of 5 % NaOH solution is added and the test tube is shaken well. Then 2 drops of 1 % Copper Sulphate (CuSO₄) are added and the tube is again shaken well. When violet or pink or red color appears in the solution then it is confirmed that Protein is present.

B) Biochemical Tests for Carbohydrates

Materials

Test tube, Test tube stand, Test tube holder, Burner

Chemicals

Solution of Reducing Sugars (e.g. Glucose, Fructose, Sucrose etc), Benedict's Reagent, Fehling's Reagent, Starch Solution, Glycogen Solution, Iodine

Procedure

Perform the test, take the observations and draw the results.

A) Preliminary Test for Carbohydrates

2 ml of original solution (O.S) is taken in a test tube and the test tube is heated on the burner. When no ppt appears it is inferred that Carbohydrates may be present.

B) Confirmatory Tests for Carbohydrates

I) Confirmatory Test for Reducing Sugars such as Glucose, Ribose, Galactose, Sucrose etc:

Reducing Sugars are the sugars which can reduce acidic or alkaline solution of higher metals. Or
Reducing sugar reduce soluble blue copper (Cu^{+2}) of copper sulphate into insoluble red-brown copper oxide Cu^{+1} , as red ppt.

a) Bendeict's Test: -

2 ml of Benedic's reagent is taken in a test tube and then 2ml of O.S is added in the test tube. The test tube is boiled gently for two minutes. When a blue color of the solution in the test tube is changed into green, then yellow to orange and finally into brick red color, then it is confirmed that Glucose or other reducing sugar is present.

b) Fehling's Test: -

2 ml of O.S and 2 ml of Fehling' reagent are taken in the test tube and the test tube is shaken well and is then boiled. When brick red ppt. appears then it is confirmed that Glucose or any other reducing sugar is present.

II) Confirmatory Test for Starch: -

2ml of O.S is taken in the test tube and then few drops of Iodine Solution are added and the test tube is shaken well. When the solution becomes blue black in color then it is confirmed that Starch is present.

III) Confirmatory Test for Glycogen: -

2 ml of O.S is taken in the test tube and then few drops of iodine are added in the solution. The test tube is the shaken well. When red color appears in the solution then presence of Glycogen is confirmed.

C) Biochemical Tests for Lipids

Materials

Test tube, Test tube stand, Test tube holder, Burner, Filter Paper

Chemicals

Sudan III Reagent, Ethanol, Fat or Oil or any other Lipid

Procedure

Perform the test, take the observations and draw the results.

A) Preliminary Test for Lipids

i) Heating Test:

on 2 ml of Fat or Oil (O.S) is taken in a test tube and the test tube is heated the burner. When no ppt appears it is inferred that Lipid may be present.

i) Spot Test: -

inferred A drop of O.S is poured on a filter paper and the solution is allowed to dry. When a clear greasy spot is formed on the filter paper then it is that fat or oil (lipid) may be present.

B) Confirmatory Tests for Lipids

a) Sudan III Test: -

a 2 ml of O.S, 2 ml of water and few drops of Sudan III reagent are added in test tube. When a red colored layer is appeared on the surface of solution then presence of fat or oil (lipid) is confirmed.

b) Emulsion Test: -

2 ml of fat or oil (O.S), 2 ml of absolute alcohol (Ethyl Alcohol) and equal volume of cold water are taken in a test tube. When a cloudy white suspension is formed then it is confirmed that oil or fat or any other lipid is present in the solution.

C) Biochemical Tests for DNA

Materials

Test tube, Test tube stand, Test tube holder, Water Bath, Beakers

Chemicals

Commercial DNA, Sodium Chloride, Distilled Water (For preparing DNA solution), Diphenylamine Reagent, Indole Reagent

Procedure

Perform the test, take the observations and draw the results.

a) Diphenylamine Test: -

the 2 ml of O.S (DNA Solution), 4 ml of Diphenylamine Reagent are taken in a test tube. The test tube is heated on boiling water bath for 10 minutes and the solution is cooled. When blue color appears in the solution, then it is confirmed that DNA is present.

b) Indole Test: -

solution 2 ml of O.S and 3 ml of Indole Reagent are taken in a test tube. The in is boiled in water bath for 15 minutes. When Straw-Yellow color appears the solution then presence of DNA is confirmed.

Papers of different Punjab
Boards-- 2013

Multan Board

Biology Paper-I (New Course)

2013

(A)

SECTION-IV (PRACTICAL PART)

10. Attempt any three parts.
15

5x3=

- (A). (a)** You are provided with a solution, a Carbohydrate and Bendict's solution. Write biochemical test for presence of the substance possible with that reagent. 3
- (b)** What are Disaccharides? Give two examples. 2
- (B). (a)** You are provided with flower of *Lythyrus odoratus*. Describe the following parts of flower in Technical terms: (a) Calyx (b) Corolla (c) Androcium 3
- (b)** Differentiate between Perfect and Imperfect Flower. 2
- (C). (a)** Sketch and Label the diagram of Digestive System of Cockroach. 5
- (D). (a)** How will you measure the effect of wind on transpiration? Write down its procedure. 3
- (b)** Name any two factors which increase the rate of transpiration. 2
- (E)** Give one character for the identification of following laboratory specimens: 5

- (i) Ulva

(iii) Sporophyte of Funaria (Moss plant)

(v) T.S of Dicot stem
- (ii) Paramecium

(iv) Pinus male one

Answers

(A). (a) Bindict’s solution is used to confirm reducing sugar.
Procedure: -
2 ml of Benedic’s reagent is taken in a test tube and then 2ml of O.S is added in the test tube. The test tube is boiled gently for two minutes.
When a blue color of the solution in the test tube is changed into green, then yellow to orange and finally into brick red color, then it is confirmed that
Glucose or other reducing sugar is present.
Or
Take two test tubes and mark (1) and (2). Dissole 5gm of glucose to make 10 ml of solution in test tube (1), and dissolve 5 gm of sucrose to make 10 ml of solution in test tube (2).
Now take 2 ml of glucose solution, add Bendict’s solution and boil.
Repeat the same with sucrose solution in a separate test tube.

| Experiment | Observation | Inference |
|---|--|--|
| 1. 2 ml of glucose Solution +Bendict’s Solution and boil | Blue turn to gree then to yellow to orange. Brick red ppt is formed. | Reducing sugar like glucose, fructose or maltose is present. |
| 2. 2 ml of sucrose solution + Bendict’s solution and boil | No change | Reducing sugar is absent. |

(b) Disscaharide is a carbohydrate which yields two monosaccharides on hydrolysis.
Examples: Maltose, Lactose

(B). (a) Description in technical terms the following parts of *Lathyrus odoratus*

- (a) **Calyx:** Five, gamosepalous, inferior, green.

(b) **Corolla:** -Five, polypetalous, papilionaceous, consisting of a large posterior petal, the **standard** or **vexillum**, two lateral petals, the **Alea** or **wings**, and two inner or anterior petals fused to form a boat-shaped structure, the **keel** or **carnia**.

(c) **Androcium:** Ten, diadelphous, nine united to form a tube around obary and the tenth posterior one free, basifixed, the keel.

(b)

| Perfect Flower | Imperfect Flower |
|--|--|
| 1. A flower with both stamens and carpels is | 1. Imperfect flower has stamens or carpels but not both. |

| | |
|--|--|
| perfect. 2. It is also known as bisexual or hermaphrodite flower. | 2. It is also known as unisexual flower. |
|--|--|

(C). (a) **Labeled Diagram of Digestive System of Cockroach: -**
See page number: 7

(D). (a) **Procedure:**

1. Take a Gannong’s potometer and fix it horizontally with the help of a stand and clamps.
2. Fill the apparatusus completely with water.
3. Dip the bent end of graduated capillary tube in the water in a beaker.
4. A good sized shoot of some herbaceous plant such as sunflower or tomato is cut in water and fix it through a rubber cork to the side arm of the potometer. Air tight the apparatus with wax or Plaster of Paris.
5. Remove the beaker of water aside for few seconds, gently tap bent end of apparatus so that an air bubble may pass into it. Replace the beaker.
6. Note the distance traveled by the bubble in one minute in a graduate tube.
7. Remove the beaker again and allow a new bubble to to enter the capillary tube. Again note the distance the bubble travel in one minute. Make at least three successive readings and record your observation in the given table. This will give you rate of transpiration in normal conditions at low wind.
8. Put a table fan near the apparatus, after five minutes take three more readings with the plant exposed to same conditions as in the 1st case of reading.taken. Record your observations.

| | Distance covered by in mm bubbles in one minute rate | Rate of transpiration = Distance traveled - = 60 =-mm/sec | Average rate of transpiration = Some of rate of transpiration 3 | Effect at rate of transpiration |
|--|--|---|---|---------------------------------|
| Plant in under low wind/high wind 1. 2. 3 | | | | |

(b) Wind and number of stomata of leaves

(E) **One identification character of laboratory specimens: -**

(i) **Ulva:** Sheet like body with two layers of cells and wavy margins

- (ii) **Paramecium:** Slipper like body with anterior round and posterior pointed end, cilia around the whole bdy, has two nuclei, contractile vacuole, cytostome etc.
- (iii) **Sporophyte of Funaria (Moss plant):**
Sporophyte is leaf less with capsule bearing spores, long seta and foot that is embedded in the female gametophyte
- (iv) **Pinus male cone of Pinus:** Small in size of about one inch in length with a large number of one type of microsporophyll scales bearing microsporangia
Or
Each male cone is 2-3 cms in length bearing microsporophyll, each microsporophyll with two microsporangia.
- (v) **T.S of Dicot stem:** Pith is well developed. Vascular bundles are arranged in the form of rings.

Dera Ghazi Khan Board

Biology Paper-I (New Course) 2013 (A)

SECTION-IV (PRACTICAL PART)

10. Attempt any three parts from A, B, C, D and E. 5x3 =15

(A). (i)

(ii)

Write down procedure of Millon’s Test for the presence and confirmation of proteins.

What is the color of Iodine solution.

3

2

(B). (i)

(ii)

Describe in technical terms the following parts of *Solanum nigrum*.

>Calyx
>Corolla
>Androcium

Differentiate between epigynous and hypogynous flowers.

3

2

(C)

(D). (i)

(ii)

Sketch and label the diagram digestive system of frog.

Write the procedure to measure the factors (wind) affecting the rate of transpiration by potometer.

What is transpiration? Give its two types.

5

3

2

(E)

Following specimens were studied in the laboratory. Give one character of each to identify.

(i) Paramecium

(iii) Adiantum (Sporophyte)

(iv) Male cone of Pinus

(ii) Euglena

(v) T.S of bifacial leaf

Answers

(A). (i) Procedure:

2 ml of protein solution is taken in a test tube. Then 2 ml of Millon’s reagent is added in the solution. After that solution is boiled. When white precipitate (ppt) appears before boiling protein, it is inferred that protein is present and when brick red color appears after boiling then it is confirmed that protein is present.

Or

| Experiment | Observation | Inference |
|------------|-------------|-----------|
| | | |

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| | | | |
|----|---|---------------------------------|---|
| 1. | 2ml of O.S (Albumen solution)+ 5 drops of Millon's reagent | White ppt | Protein may be present. |
| 2. | Now boil the Above mixture. | Brick red solution No change | Protein is confirmed Protein is absent. |

(ii) **Color of Iodine:** -
Brown

(B). (i) **Description in technical terms the following parts of *Solanum nigrum*:**

- >**Calyx**- Five, gamosepalous, green, persistent, hairy, inferior.
- >**Corolla** Five, gamosepalous, white, rotate, inferior.
- >**Androcium** Five, polyandrous, epipetalous, alternating with petals, filaments short.

(ii)

| Epigynous | Hypogynous |
|---|--|
| 1. Thalamus is cup shaped or convex covering the ovary completely. | 1. Thalamus is cone shaped or concave, ovary occupying the top most position. |
| 2. Rest of the floral leaves such as sepals, petals and stamen lie at the tip of thalamus above the ovary | 2. Rest of the floral leaves lie at lower level than ovary. |
| 3. Ovary is said to inferior. | 3. Ovary is said to be superior. |

(C) **Labelled Diagram Digestive System of Frog:** -
See Page Number: 3

(D). (i) **Procedure to measure the factors (wind) affecting the rate of transpiration by potometer:**

See Page Number: 26

(ii) **Transpiration and its Two Types:** -

The loss of water vapors from the aerial surfaces of a plant (i.e. leaves and stem)

- 1. **Stomatal transpiration----**The loss of water vapors through stomata
- 2. **Cuticular transpiration---**Escape of water vapors from the cuticle of leaves

(E) **One identification character of laboratory specimens:** -

- (i) ***Paramecium*:** Slipper like body with anterior round and posterior pointed end, cilia around the whole bdy, has two nuclei, contractile vacuole, cytostome etc.
- (ii) ***Euglena*:** Elongated, spindle-shaped body with two flagella, stigma, cytopharynx, reservoir, contractile vacoules and chloroplasts
- (iii) ***Adiantum (Sporophyte)*:** It has short thick horizontal underground rhizome from which arise aerial branches which have stipe and rachis with fronds

(compound leaves with sporangia) bearing leaflets (pinnae and pinnules) showing dichotomous venation. Or
Sporophyte can be distinguished into roots (adventitious), stem and leaves (compound and alternate in arrangement).

(iv) **Pinus male cone of *Pinus*:** Small in size of about one inch in length with

a

large number of one type of microsporophyll scales bearing microsporangia

(v) **T.S of bifacial leaf:** Upper epidermis with thick cuticle and without stomata, Lower epidermis with thin cuticle and stomata surrounded by guard cells, vascular bundle in the middle, Palisade mesophyll cells

near

the upper epidermis and spongy mesophyll cells below the Palisade mesophyll cells having air spaces

Bahawalpur Board

Biology Paper-I (New Course)

2013 (A)

(PRACTICAL PART)

- Q. No.10 (a)** (3)
(2)
- (i) Write down the procedure for confirmatory test of Starch.
(ii) What is Reducing Sugar? Name atleast one reducing sugar.
- (b) (i) You are provided with flower of *Rosa indica*. Describe its technical terms its:
(3)
(i) Calyx (ii) Corolla (iii) Androcium
(ii) Differentiate between Apocarpous and Syncarpous Gynoecium.
(2)
- (c) Sketch and label the diagram of Digestive System of Frog.
(5)
- (d) (i) Write down the procedure to measure the factors (removal of leaves) affecting the rate of transpiration by Potometer. (3)
(ii) Name two types of Transpiration. (2)
- (e) Following specimen / slides were studied in the laboratory. Give one character of each to identify:
(i) *Euglena* (ii) *Amoeba* (iii) Stomata
(iv) Male cone of *Pinus* (v) *Paramecium*

Answers

- Q. No.10 (a)** (i) **Procedure:** -
Iodine 2ml of O.S is taken in the test tube and then few drops of
Solution are added and the test tube is shaken well. When the solution becomes blue black in color then it is confirmed that Starch is present. Or
Grind some fresh leaves in mortar and pestle, collect it into a test tube as original solution. Take 2 ml of original solution
(O.S) into another test tube, dilute it up to 5 ml with distilled water.

potato
of
Now add few drops of iodine solution. Cut a thin slice of
and pour some drops of aqueous iodine solution on the surface
potato slice with the help of a dropper.

| Experiment | Observation | Inference |
|--|--|--|
| 1. 2ml of O.S + 3ml of distilled water + few drops of iodine solution drop by drop | Solution turns into blue color Solution turns into violet color | Amylose starch is present Amylopectin starch is Present |
| 2. Potato slice + few drop of iodine solution | Surface of potato slice turns violet | Starch is present |

copper
oxide
(i) **Reducing sugar and its example:-**
Reducing sugar is the sugar which reduces soluble blue
(Cu+2) of copper sulphate into insoluble red-brown copper
Cu+1, as red ppt.
Glucose is a reducing sugar.

Rosa
(b) (i) **Description in technical terms the following parts of indica.**
(i) **Calyx:** Five, gamosepalous, inferior, green.
(i) **Corolla:** Petals five or multiple of five , polypetalous, large, colored and conspicuous
(i) **Androcium:** Stamens numerous, free (polyandrous), inferior

(c) **Labelled Diagram of Digestive System of Frog: -**
See page number: 3
(d) (i) **Procedure to measure the factors (removal of leaves) affecting the rate of transpiration by potometer:**
a) **Procedure for rate of transpiration of a plant in normal condition:**
See page number:
b) **Removal of Some Leaves:**
Remove leaves from the shoot which is already fixed in potometer. After 5 minutes take three more readings in the same conditions as in the 1st case of reading. Record your observations.

| | | | | |
|--|--|--|---|---------------------------------|
| | Distance covered by in mm bubbles in one minute rate | Rate of transpiration = Distance traveled - = 60 | Average rate of transpiration = Some of rate of transpiration | Effect at rate of transpiration |
|--|--|--|---|---------------------------------|

- (A) (a) **Procedure: -**
See Dera Ghazi Khan Board Answer (A) (i) (A-2013)
- (b) **Proteins and two functions of proteins:**
- (a) **Proteins:**
Proteins are polymers of amino acids, the compounds containing, nitrogen and oxygen.
- (b) **Two Functions of Proteins: -**
1. They control whole metabolism of cell as all enzymes are proteins.
 2. They, in the form of antibodies, defend the body against pathogens.

- (B) (a) **Description in technical terms the following parts of *Lathyrus odoratus*.**
See Multan Board Answer (B) (a) (A-2013)

(b) **Difference between complete and incomplete flower:**

| Complete Flower | Incomplete Flower |
|--|---|
| Flower having all four types of floral leaves is called Complete Flower. | It is the flower which lacks any one of the four types of floral leaves |

- (C) **Labelled Diagram of Digestive System of Cockroach:**
See Page Number: 7

- (D) (a) **Procedure for the investigation of effect of temperature on activity of**

Enzyme (pepsin):
Take four clean test tubes and mark them 1 to 4. Pour 5ml of stock solution of albumen in each test tube. Add 5ml of HCl and 1ml of pepsin solution in each test with pH paper, it should be in between 1.5 to 3. Place these tubes separately in water baths at different temperature for 15 minutes.

| Sr No. | Experiment | Temperature | Observation | Inference |
|--------|---|-------------|-------------|-----------|
| 1. | Stock solution (5ml)+ HCl (5ml) + 1ml of pepsin | 10 C | | |
| 2. | Stock solution (5ml)+ HCl (5ml) + 1ml of pepsin | 20 C | | |
| 3. | Stock solution (5ml)+ HCl (5ml) + 1ml of pepsin | 37 C | | |
| 4. | Stock solution (5ml)+ HCl (5ml) + 1ml of pepsin | 55 C | | |

- (b) **pH and this abbreviation stand for:-**
It is a measure of acidity or alkalinity of a substance.
This abbreviation stands for hydrogen ion concentration.

- (E)
- (i) **Euglena:** See Dera Ghazi Khan Board Answer (E) (ii) (A-2013)
- (ii) **Yeast:** Yeast cell is oval with three layered wall, large central vacuole, and
- 487

- a large nucleus
- (iii) **Marchentia:** -It has a dorsoventrally flattened and dichotomously branched thallus
- (iv) **Adiantum:** Adiantum has leafy sporophyte and heart shaped gametophyte.
- (v) **Dicot Stem:** It is either herbaceous or woody.

Lahore Board

Biology Paper-I (New Course) Group II

2013

(A)

(PRACTICAL PART)

Note: Attempt any THREE questions.

- (A) (a) You are provided with egg albumin and Millon's reagent. Write biochemical test for the substance which egg albumin contains. 3
 (b) Name the reagents used to detect reducing sugar and starch. 2
- (B) (a) You are provided with flower of *Solanum nigrum*. Describe its technical terms its parts: (i) Calyx (ii) Androecium (iii) Gynoecium 3
 (b) Differentiate between complete and incomplete flower. 2
- (C) Sketch and label the diagram of digestive system of cockroach. 5
- (D) (a) Write down the procedure for the investigation of effect of temperature on activity of Enzyme (pepsin). 3
 (b) What is difference between enzyme and substrate? 2
- (E) You are provided following specimens. Give one character for each to identify: 5
 (i) Chlorella (ii) Amoeba (iii) Male Marchentia
 (iv) Adiantum (v) T.S of Dicot Stem

Answers

- (A) (a) **Procedure:** -
 See Dera Ghazi Khan Board Answer (A) (i) (A-2013)
 (b) **Names of the Reagents to detect Reducing Sugar and Starch:**
 1. Reagent used to detect reducing sugar--- Benedict's reagent
 2. Reagent used to detect starch -----Iodine
- (B) (a) **Description in technical terms the following parts of *Solanum nigrum*:**
 (i) **Calyx** - Five, gamosepalous, green, persistent, hairy, inferior.
 (ii) **Androecium--** Five, polyandrous, epipetalous, alternating with petals, filaments short.
 (iii) **Gynoecium**-Bicarpellary, syncarpous, ovary superior
 (b) **Difference between complete and incomplete flower:** -
 See Lahore Board Answer (B) (b) (Group I-A-2013)

- (C) **Labeled Diagram of Digestive System of Cockroach:**

See Page Number:

(D) (a) **Procedure for the investigation of effect of temperature on activity of**

Enzyme (pepsin): -

See Lahore Board Answer (D) (a) (Group I-A-2013)

(b) Difference between Enzyme and Substrate: -

| Enzyme | Substrate |
|--|--|
| 1. It is a globular protein molecule. | 1 It is any organic molecule. |
| 2. It acts on the substrate and changes it into product (s). | 2. It is a reactant molecule which is acted by the enzyme and is changed into product (s) by the enzyme. |

(E)

- (i) **Chlorella:** It has pherical body with thick cell wall and cup-shaped chloroplast
- (ii) **Amoeba:** See Bahawalpur Board Answer (e) (ii) (A-2013)
- (iii) **Male Marchentia:** It has antheridiophores having irregular wavy marginal male receptacles
- (iv) **Adiantum**-See Lahore Board Answer (E) (iv) (Group I-A-2013)
- (v) **T. S of Dicot Stem**See Multan Board Answer (E) (v) (A-2013)

Gujranwala Board

Biology Paper-I (New Course)

2013 (A)

(PRACTICAL PART)

- Q. No.10 (a)** (i) You are provided with egg albumin and millon's reagent (3)
- (2) (ii) Write biochemical test for the substance which egg contains. What are proteins?
- (b) (i) You are provided with flower of *Rosa indica*. Describe in technical terms its: (3)
- (i) Corolla (ii) Androcium (iii) Gynacium
- (ii) Differentiate between Actinomorphic and Zygomorphic flower. (2)
- (c) Sketch and label the diagram of Digestive System of Frog. (5)
- (d) (i) Write the procedure for measuring blood pressure during rest and after exercise with B.P apparatus. (3)
- (ii) Differentiate between systolic and diastolic blood pressure. (2)
- (e) Give one character for the identification of the following laboratory specimens. (5)
- (i) *Euglena*

- (ii) *Penicillium*
(iii) Female Cone of Pinus
(v) T. S. of Monocot Stem

Answers

Q. No.10 (a) (i) Procedure: -

See Dera Ghazi Khan Board Answer (A) (i) (A-2013)

(ii) Proteins: -

Proteins are polymers of amino acids, the compounds
nitrogen and oxygen.

containing,

(b) (i) Description in technical terms the following parts of *indica*.

(i) Corolla: Petals five or multiple of five , polypetalous, large, colored and conspicuous

(ii) **Androecium:** Stamens numerous, free (polyandrous), inferior

(iii) Gynacium: Polycarpellary usually indefinite,

Apocarpous, Superior

Ovary

(ii) Difference between Actinomorphic and Zygomorphic

flower: -

| Actinomorphic Flower | Zygomorphic Flower |
|--|---|
| Flower which can be cut into two equal parts in more than one planes | A flower which can be divided into two equal parts or halves only only one vertical plane |

(c) Labeled Diagram of Digestive System of Cockroach:

See Page Number:

(d) (i) Procedure for measuring Blood Pressure during Rest and after

Exercise with B.P apparatus.

- i. Wrap the rubber cuff of syphygmomanometer around the arm over the branchial artery.
- ii. Pump air until air pressure exceeds the blood pressure within the artery.
- iii. Release air slowly in the cuff by means of a knob just near hand pump. The air pressure is decreased until it equals the blood pressure within the artery.
- iv. A tap like sound is produced which is followed by louder sounds which slowly disappear.
- v. The column of mercury at the first tap like sound represents systolic pressure while at the point at which sounds suddenly become faint is the diastolic pressure.
- vi. Record observations at rest and after exercise in the given table.

| B.P. | Systolic mm of Hg | Diastolic mm of Hg |
|----------------|-------------------|--------------------|
| At rest | | |
| After exercise | | |

(ii) Difference between Systolic and Diastolic Blood Pressure: -

| Systolic Blood Pressure | Diastolic Blood Pressure |
|--|---|
| It is the force of blood with which ventricles contract. | It is the force of the blood when the ventricles are relaxed. |

- (e) (i) **Euglena** ----- See Dera Ghazi Khan Board Answer (E) (ii) (A-2013)
- (ii) **Penicillium** ----- It is fungus with septae hyphae which has characteristic brush-like arrangement of conidia borne on special hyphae called conidiophores.
- (iii) **Female Cone of Pinus**---- Large woody cone with two types of megasporophyll scales i.e.thick ovuliferous scales and thin bract scales bearing megasporangia
- (v) **T. S. of Monocot Stem**-----Pith is absent. Vascular bundles are scattered in the ground tissues.

Rawalpindi Board

Biology Paper-I (New Course)

2013 (A)

(PRACTICAL PART)

- Q. No.10 (A)** (i) You are provided with Benedict solution and an unknown solution. (3)
- unknown (2)
- (ii) Write down biochemical test for the substance which the solution contains.
- (ii) Name two reducing sugars.
- (B)** (i) You are provided with a flower of *Lathyrus odoratus*. Describe in technical terms of following parts. (3)
- (ii) (i) Calyx (ii) Corolla (iii) Gynacium
- flower. (2)
- (ii) Differentiate between Zygomorphic and Actinomorphic
- (C)** Sketch and label the diagram of Respiratory System of Frog. (5)
- (D)** (i) Write the procedure to measure the effect of different factors, e.g., temperature, effecting the rate of transpiration using potometer. (3)
- (ii) Enlist two factors which decrease the rate of transpiration. (2)

- (5) (E) Give one character of each to identify the following specimens.
- (i) *Volvox* colony
 - (ii) Female *Marchentia*
 - (iii) Yeast
 - (iv) *Paramecium*
 - (v) T. S. of Monocot Stem

Answers

- Q. No.10 (A) (i) Procedure: -**
See Multan Board Answer (A) (i) (A-2013)
- (ii) Names of two reducing sugars: -**
1. Glucose
 2. Fructose

- (B) (i) Description in technical terms the following parts of *Lathyrus odoratus***
- posterior petal
- Wings and two
- encloses stamens and
- (i) Calyx -----** Five Sepals, Gamosepalous
- (ii) Corolla -----** Five Petals, Papilionaceous. There is large
- called Standard, two lateral petals called
- inner petal fused to form Keel which
- carpels
- (iii) Gynacium ----** Monocarpellary, Superior Ovary
- (ii) Difference between Actinomorphic and Zygomorphic**
- flower: -**
- See Gujranwala Board Answer No: 10 (b) (ii) (A-2013)

- (C) Labeled diagram of Respiratory System of Frog:**
See page No:

- (D) (i)**
1. Take a Gannong's potometer and fix it horizontally with the help of a stand and clamps.
 2. Fill the apparatus completely with water.
 3. Dip the bent end of graduated capillary tube in the water in a beaker.
 4. A good sized shoot of some herbaceous plant such as sunflower or tomato is cut in water and fix it through a rubber cork to the side arm of the potometer. Air tight the apparatus with wax or Plaster of Paris.
 5. Remove the beaker of water aside for few seconds, gently tap bent end of apparatus so that an air bubble may pass into it.
 6. Note the distance traveled by the bubble in one minute in a graduate tube.
 7. Remove the beaker again and allow a new bubble to to enter the capillary tube. Again note the distance the bubble travel in one minute.
- Make at least three successive readings and record your observation in the given

conditions at table. This will give you rate of transpiration in normal normal sunshine.

8. Put the apparatus in the sunshine when the temperature is very high. After five minutes take three more readings with the plant exposed to same conditions as in the 1st case of reading.taken. Record your observations.

| | Distance covered by in mm bubbles in one minute rate | Rate of transpiration = Distance traveled - = 60 =-mm/sec | Average rate of transpiration = Some of rate of transpiration 3 | Effect at rate of transpiration |
|---|--|---|---|---------------------------------|
| Plant in under low temperature/h igh temperature 1. 2. 3 | | | | |

(b) Wind and number of stomata of leaves

- (E)

(i) **Volvox colony**---- Spherical colony of biflagellate cells with cytoplasmic connections and is surrounded by macilagenous sheath, have daughter colonies
- (ii) **Female Marchentia** ----- Dichotomously branched thallus with archegoniophore having star shaped female receptacles

(iii) **Yeast**----- Oval shaped cell with three layered wall, large central vacuole, and a large nucleus
- (iv) **Paramecium** ----- See Multan Board Answer (E) (i) (A-2013)

(v) **T. S. of Monocot Stem**----- Pith is absent. Vascular bundles are scattered in the ground tissues.

Sargodha Board

Biology Paper-I (New Course)

2013 (A)

(PRACTICAL PART)

- Q. No.10 (a)

(i) You are provided with egg albumin solution and Millon’s (3) Reagent. Write biochemical test for possible substances present In the egg.
- (2)

(ii) Name the food stuff which are rich source of proteins.

- (b) (i) Flower of *Solanum nigrum* is provided to you. Describe in technical terms following parts of flower: (3)
- (i) Calyx (ii) Corolla (iii) Androecium
- (ii) Differentiate between hypogynous and epigynous flower. (2)
- (c) Sketch and label the diagram of Respiratory System of Frog. (5)
- (d) (i) Write the procedure to study the effects of various factors (removal of some leaves) on the rate of transpiration using Potometer. (3)
- (ii) Name the two factors which decrease the rate of transpiration. (2)
- (e) Following specimens/slides were studied in the laboratory, give (5)
- one character of each to identify.
- (i) *Paramecium*
- (ii) *Utilago tritici*
- (iii) Funaria sporophyte
- (iv) T. S. of Monocot Root
- (v) Pinus female cone

Answers

- Q. No.10 (a) (i) Procedure: -**
See Dera Ghazi Khan Board Answer (A) (i) (A-2013)
- (ii) Food Stuff with Rich Source of Proteins: -**
Egg, Meat etc.
- (b) (i) Description in technical terms the following parts of *Solanum nigrum*:**
- (i) Calyx -** Five, gamosepalous, green, persistent, hairy, inferior.
- (ii) Corolla---** Five Petals, Gamopetalous
- (iii) Androecium--** Five, polyandrous, epipetalous, alternating with petals, filaments short.
- (ii) Difference between Hypogynous and Epigynous Flower: -**
See Dera Ghazi Khan Board Answer No: 10 (b) (ii)
- (c) Labeled diagram of Respiratory System of Frog: -**
See page No:
- (d) (i) Procedure: -**
- a) Normal Conditions: -**
See Rawalpindi Board Answer No: (D) (i)
- b) Removal of some leaves: -**
Remove few leaves from the shoot which is already fixed in potometer. After 5 minutes take three more readings in the same conditions as in the first case of reading. Record your observation. reading taken. Record your observations.

| | | | | |
|--|--|---|--|---------------------------------|
| | Distance covered by in mm bubbles in one minute rate | Rate of transpiration = Distance traveled | Average rate of transpiration = Some of rate | Effect at rate of transpiration |
|--|--|---|--|---------------------------------|

| | | | | |
|---|--|-------------------|-----------------------|--|
| | | -= 60 =-mm/sec | of transpiration 3 | |
| Plant with less number of leaves1. 2. 3 | | | | |

(ii) Names of the two factors which decrease the rate of transpiration: -

- Low wind
- Low temperature

(e) (i) *Paramecium* ----- See Multan Board Answer (E) (i) (A-2013)
(ii) *Utilago tritici* ----- Septate hyphae with a large number of black telospores
(iii) *Funaria sporophyte* --- Sporophyte is leaf less with capsule bearing spores, long

seta and foot that is embedded in the female gametophyte
male and female gametophytes both are leafy and photosynthetic, female gametophyte may bear sporphyte

(iv) *T. S. of Monocot Root*---- Pith is present in the centre.
There is an alternate arrangement of phloem and xylem in the form of rings.

(v) *Pinus female cone* ----- Large woody cone with two types of megacsporophyll
scales i.e.thick ovuliferous scales and thin bract scales
bearing megasporangia

Fiaslabad Board
Biology Paper-I (New Course)
2013 (A)

(PRACTICAL PART)

- Q. No.10 (a) (3)

(i) You are provided with a solution and bendicts solution.
(ii) Write biochemical tests for the substances present in solution. Give two examples of reducing sugars. (2)
- (b) technical

(i) You are given the flower of *Lathyrus odoratus*. Describe in terms of its following parts. (3)
(i) Corolla (ii) Androcium (iii) Gynacium
(ii) What is inflorescence? Name its two types. (2)
- (c) (5)

Sketch and label the diagram of Respiratory System of Frog.
- (d) (3)

(i) Write the procedure to investigate measure the factor (wind) affecting rate of transpiration using Potometer.
(ii) Differentiate between evaporatin and transpiration. (2)

- (e) Give one character for the identification of following laboratory specimens: (5)
- (i) *Nostoc*
 - (ii) *Volvox*
 - (iii) Yeast
 - (iv) Sporophyte of *Adiantum*
 - (v) T.S. of Dicot Root

Answers

- Q. No.10 (a)**
- (i) **Procedure: -**
See Multan Board Answer (A) (i) (A-2013)
 - (ii) **Names of two reducing sugars: -**
 - 1. Glucose
 - 2. Fructose

- (b) (i) Description in technical terms the following parts of *Lathyrus odoratus***
- posterior petal
- Wings and two
- encloses stamens and
- (Diadelphous),
- tube around the
- (i) **Corolla -----**Five Petals, Papilinaceous. There is large called Standard, two lateral petals called inner petal fused to form Keel which carpels
 - (ii) **Androcium---** Ten Stamens arranged in two groups Filaments of nine stamens united to form a pistil, 10th free stamen is posterior
 - (iii) **Gynacium ----** Monocarpellary, Superior Ovary
 - (ii) **Inflorescence and it two types: -**
The mode of branching of floral axis having a group of flowers
 - 1. Racemose
 - 2. Cymose

- (c) Labeled diagram of Respiratory System of Frog: -**
See page No:

- (d) (i) Procedure: -**
See Multan Board Answer No: 10 (D) (a)
- (ii) Difference between Evaporatin and Transpiration: -**

| Evaporation | Transpiration |
|---|---|
| It is the change of water from liquid form to gaseous form. | It is the loss of water in the form of water vapors through stomata or cuticle etc. |

- (e) (i) *Nostoc* ----**It is a colony of cyanobacterium in which cells are placed end to end, mostly are oval but some are barrel shaped called Heterocysts, all are enclosed within Macilagenous sheath forming a Trichome

- central
- (iii) **Yeast** ----- Oval shaped cell with three layered wall, large vacuole, and a large nucleus
- underground rhizome
- (iv) **Sporophyte of *Adiantum***---- It has short thick horizontal from which arise aerial branches which have stipe and rachis with fronds (compound leaves with sporangia) bearing leaflets (pinnae and pinnules) showing dichotomous venation
- or absent. Xylem
- (v) **T.S. of Dicot root**--- Pith is central part of root either small is in the form of star and phloem in the space between the arms of star.
- cytoplasmic
- (ii) **Volvox** ----- Spherical colony of biflagellate cells with connections and is surrounded by macilagenous sheath, have daughter colonies

SEC TION III

Essay Type Questions from Text Book

Each question carries 8 Marks

Q. to be asked 5

Q. to be attempted 3

Total Marks: $8 \times 3 = 24$

Section III of Essay Type Questions consists of five questions i.e Q5, Q6, Q7, Q.8 and Q.9.

Only any three questions are to be attempted.

Each question has two parts "a" and "b" with four numbers each.

Number of Question to be asked from each Chapter

Chpater No: 1 1 Question of 4 Marks

Chapter No: 2 -1 Question of 4 Marks

Chapter No: 3 Nil

Chapter No: 4 1 Question of 4 Marks

Chpater No: 5 1 Question of 4 Marks

Chpater No: 6 -1 Question of 4 Marks
Marks

Chpater No: 7 Nil

Chpater No: 8 -1 Question of 4 Mark

Chpater No: 9 --4 Marks

Chpater No: 10 Nil

Chpater No: 11 -4 Marks

Chpater No: 12 -4 Marks

Chpater No: 13 -Nil

Chpater No: 14 --4